Gas Journal

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Editorial Notes

An Amazing Theory

DISILLUSIONMENT from any of our cherished beliefs is seldom agreeable. We of the " GAS JOURNAL " have, for nearly 90 years, held a faith, for which " cherished belief " is infinitely too mild a description, that the Gas Industry is a benefactor of mankind, and our faith in it as such has been progressively vindicated until to-day it is almost universally shared by the nation. To such an extent is this the case that some eight million gas cookers are in daily use in Great Britain, with a rapidly increasing belief by the public in the Industry's potential further contributions in many spheres to health and comfort.

And now, like a bolt from the blue, comes an attempt at disillusioning the millions who have for so long blessed gas for the easing of their daily domestic burdens, and the Gas Industry with all its plans for increasing its service to the great British public. We are asked, in fact, in an article in a contemporary technical journal, without any scientific proof, and certainly without much beating about the bush, to swallow no less revolutionary a theory than that one of the primary causes of cancer is the gas produced in gas-works by high-temperature carbonization, and that the alleged increased incidence of this ghastly disease in recent decades is directly bound up with the largely increased use of gas for cooking. We use the word " alleged " advisedly, because we like the comforting theory held by some authorities that the statistical increase is due rather to modern diagnosis than to any actual deterioration in the position.

We do not intend, however, at this stage to enter into any comment upon the detailed reasoning in the article. Let us leave such examination for a later date, and perhaps even to the great and learned body of the medical profession who, after years of intense study, with all the means at their disposal and the enormous qualifications which they possess, have to confess, we believe, to little progress in the region of the causation of cancer, whatever advance they have made towards cure. But we hardly know whether to compliment our contemporary, the *Engineer of India*, upon their astuteness in obtaining this article for publication, or upon the honour which has been paid them in their selection by the author as the vehicle by which his startling, and possibly social revolutionary, theory is launched upon an unsuspecting world. Probably few of our home readers are acquainted with this paper, since, although it is published monthly in London, its subscription rate is quoted in rupees, and its avowed *métier* is " to further British trade in India and the Far East."

In view of the serious indictment with which the Gas Industry is threatened—which, indeed, if it received any measure of support, would undoubtedly put an end to the entire activities of that Industry as at present carried on—we feel entitled to enquire as to the qualifications of the author, Mr. David Brownlie, to grapple with a problem which has so largely baffled the whole medical profession of the world for so many years. Considering the extreme gravity of the subject, the *Engineer of India* seems to us strangely silent about him in the introduction to the article, which is merely " by David Brownlie," but fortunately we are able to amplify this by reference to his letter heading which happens to be in our possession, according to which he is B.Sc. (Honours in Chemistry) London, a Fellow of the Chemical Society, Member of the Society of Chemical Industry, the Society of Dyers and Colourists, the American Chemical Society, the Institution of Chemical Engineers, the Institute of Metals, the Iron and Steel Institute, and the American Society of Mechanical Engineers, an Associate Member of the Institution of Mining Engineers, a Member of the South Wales Institute of Engineers, and an Associate of the Institution of Mechanical Engineers. In an editorial comment on the article, our contemporary is little more illuminating concerning the author, but it does claim that during his long investigations into the problems of low-temperature carbonization he has become one of its recognized leading exponents. In this connection we would make the interesting point that in his article Mr. Brownlie is able entirely to exonerate from suspicion any gas produced at carbonizing temperatures of about 450° to 500° C., whereas the " poisonous cancer-causing " benzenoid hydrocarbons are formed when the temperature of carbonization exceeds " about " 800° C.

We do not in the least degree question the good faith of Mr. Brownlie, but, while the *Engineer of India* comments that the theory " will certainly not be accepted by the Gas Industry with anything but the utmost trepidation," we can assure them it will not be accepted by anybody at all in its present condition. We cannot, however, believe it possible that he would have ventured forth into the world with his theory unless he had up his sleeve something more convincing in its favour than is disclosed in the present article. If he has, then un-

doubtedly he will be able to procure for its examination all the interest and thoroughness which are always available when any new angle on the cancer scourge is introduced. It is quite safe to say that a whole army of rats will have their meals cooked for months on end " under the conditions—as in types of ordinary domestic gas oven, for example—that both the gas and the waste combustion products from it are in direct contact with the meat, bread, pies, cakes, or other products during the whole process of cooking," to quote from Mr. Brownlie's article. In the meantime we cannot counsel the gas undertakings of this or any other country to hold back the vast plans they have in hand for selling still more gas, nor those who are contemplating increasing their high-temperature plant to cancel their orders.

Unfortunately we as an Industry are not likely entirely to escape annoyance in the matter, because in a few weeks' time Mr. Brownlie is publishing a book describing his new theory of the cause of cancer. Analysis of the material which appears in the general newspaper Press shows that it is based upon comparatively few themes. Of these " love," with its complications, probably holds pride of place, but " health " is always a certain winner, and cancer takes a high place among its sub-heads from the viewpoint of reader interest. We can, therefore, safely anticipate a spate of spicy headlines when Mr. Brownlie's book appears. We must only hope that the vogue of town gas as a primary cause of cancer will be short lived.

Street Lighting

The A.P.L.E. Paper by Mr. F. C. Smith and Mr. K. F. Sawyer, of the Gas Light and Coke Company, on recent developments in low-pressure gas street lighting, is essentially a practical contribution giving a wealth of useful information on the performance of modern gas street lighting equipment, and it makes manifest the very great developments which have taken place recently in the many types of gas street lantern now available to the lighting engineers. It shows, too, to what good effect the Gas Industry and the manufacturers of lamps have studied the technique of the illumination of our highways in the interests of safety. Once again we are glad to note the Authors' insistence—we have stressed this many times in these columns—that the primary function of a street lighting installation is to enable all users of the road to see clearly, quickly, and comfortably. This may appear obvious, but there has been too great a tendency to evaluate the merits of street lighting installations in terms of one characteristic—be that characteristic horizontal or vertical illumination, background brightness, or light output. The fact is that all these, together with such factors as glare, must be considered in their combined effect in promoting visibility.

It is seeing in the street that is the important matter, and the manufacturers of gas lighting equipment have fully recognized the need for a series of units covering a wide range of light output with varying distribution characteristics so that the lantern distribution most suited to the purpose in hand is readily available. Moreover, all the gas lamps have been designed so that maintenance can be carried out quickly and effectively without disturbing the directive equipment. On the general question of maintenance, we have previously called attention to the criticism by Mr. C. I. Winstone, in his Presidential Address to the Association, of the 50% depreciation allowed in the British Standards Institution Street Lighting Specification. The most important factor influencing luminous output is the quality of the general maintenance work, and the allowance of 50% tends to cause the maintenance of installations to be neglected. The Gas Industry has no need for such an allowance in a specification. It has been shown that a very high standard of maintenance of gas street lighting installations can be achieved at a reasonable cost. Mantles have an average life of approximately 2,000 lighting hours, and even at the end of this period replacement is consequent on mechanical damage rather than because of any marked fall in the light output. Many gas undertakings are now prepared to contract to maintain lighting installations within 20% of their initial values.

In their Paper Messrs. Smith and Sawyer comment on the experimental work at present in progress on visibility, and point out that good visibility cannot be achieved unless the quantity of light falling upon the road and other essential backgrounds exceeds a certain minimum. " As the utilizable light is increased above this minimum value the ease of seeing increases, rapidly at first, then more slowly to a level which is quite adequate. Above this level the small increase in seeing ability resulting from an increase in the light used is no longer worth the additional cost involved." The fact that visibility does not increase *pro rata* to lumen output should be strongly emphasized. Electrical interests are making much play with this question of lumen output; and at the A.P.L.E. Conference Mr. J. N. Waite, the Hull Borough Electrical Engineer, put in a plea that for street lighting purposes light sources should be defined in lumens, which, he argued, would enable accurate comparisons to be made. Lumen output is not the sole criterion of the effectiveness of a light source; and obviously light which goes up into the heavens is no good for lighting a road. We referred last week to the attack made by Mr. W. J. Jones, of the Lighting Service Bureau of the Electric Lamp Manufacturers' Association, on the performance figures put forward by the Gas Industry for gas lighting equipment. This attack was as absurd as it was ill-timed; and an invitation was publicly issued to him to visit the Watson House Laboratories of the Gas Light and Coke Company and measure for himself the performance of the gas lamps which he challenged.

Higher Lumen Output

Mr. Jones complained that both he and Mr. Waite could not obtain information regarding the total light emission from high-pressure lamps, which is surprising in view of the full information which has been available for many years. Five years ago, for example, in September of 1932, Mr. F. C. Smith gave a Paper to the Association of Public Lighting Engineers in which he put forward photometric data relating to both low-pressure and high-pressure units, setting out gas rate, candle power, total luminous flux, and many other figures of performance. Since that time great developments have taken place. In regard to low-pressure lighting we have already commented in these columns on the new low-pressure high intensity gas lamp introduced to the A.P.L.E. at Folkestone by Mr. George Keith—a unit which shows an increased light output of a matter of 50% for the same amount of gas consumed. An output of 15,000 lumens is obtained from the four-light size of this low-pressure lamp. In their Paper, which will be published in next week's " Journal," Messrs. Smith and Sawyer mention that other developments which involve the substitution of the usual injector principle by more efficient means of primary air induction have given promising re-

sults in the research laboratories of the Gas Light and Coke Company and will no doubt lead to greatly increased efficiencies in the near future.

The Conference of the A.P.L.E. at Folkestone was an outstanding success, and gas made a very fine showing indeed. It was characterized by wholehearted co-operation between the Gas Industry and the manufacturers of gas lighting equipment; and with this strengthened co-operation we can look to the future with still greater optimism and confidence. We know that gas can meet every modern street lighting requirement, and the demonstrations of lighting staged at Folkestone must surely have convinced those responsible for public lighting that gas is destined to play a more important part in the lighting of our highways in the future. The installations of gas lighting on view at Folkestone were essentially of a practical and economical order. Members of lighting committees were able to see for themselves what value they can get for money in gas street lighting. They could see, for example, thoroughfares illuminated by gas to a generous " D " class of the B.S.I. Specification, in every way satisfactory, for a gas consumption of 30 cu.ft. per 180 ft. of road. The whole of the demonstration was encouraging and all the firms who took their part in it are to be congratulated on a really first-class effort.

The problem before the lighting engineer and those responsible for the spending of ratepayers' money is to obtain the most satisfactory all-round results for the amount expended. The Folkestone Conference, to some of the outstanding features of which we have referred in these columns, concentrated on the lighting of main roads. Important as this aspect of public lighting undoubtedly is, the adequate illumination of residential roads and side streets must not be allowed to suffer as a result of concentration on main roads. To have stretches of main road flooded with light—spectacular, perhaps, but probably beyond the real requirements—and to neglect the side streets cannot be regarded as wise expenditure. What is needed is the judicious spreading-out of the money available on traffic routes and side roads. We regard this matter as of great importance and are glad that the point was raised at the Conference. Residential and side roads, it must be remembered, constitute 75% of the roads of the country, and their satisfactory illumination requires a technique distinct from the lighting of main traffic thoroughfares. The Gas Industry has equipment excellent for the lighting of side roads—a problem which, we think, deserves more attention than it has received lately. The suggestion was thrown out at the Conference, and it is one we heartily endorse, that the economic aspect of lighting side roads might well provide the subject of a Paper at the next Conference of the Association of Public Lighting Engineers. We urge upon the Gas Industry the desirability of developing the technique of side road illumination hand in hand with that of the lighting of main roads. To either purpose, and under whatever conditions, it can be shown that gas is admirably suited.

Future Gas Heating

In the " JOURNAL " for Aug. 11, discussing the gas heating load, we suggested that the future may well see a combination of air heating and radiant warmth by gas. There will be available small independent gas units serving to take the chill off the air—to effect what we termed " background heating." The requirements for comfort are determined by air temperature, radiation, ventilation, and a cheerful appearance of warmth. Flexibility between these factors is needed, and we asked how we are to achieve the best measure of flexibility to ensure comfort. The gas fire heats and ventilates and it quickly produces radiant heat in a cold room. Great advances have been made in its performance and the quality of radiant energy emitted, but it will be agreed that there are conditions when, in a cold room, we have to sit too close to the gas fire to offset the chill from the cold walls and surroundings behind. Air heating by radiant heat is essentially an indirect process. Since the radiation does not warm the intervening air it is first necessary to heat the walls, furniture, and other surrounding objects, which in turn transmit their heat to the air. Would it not be desirable, then, to provide some form of background heating to take the chill off the air and thus give the radiant heater a fair and good start.

We must emphasize at once that the whole essence of background heating consists not in supplanting the radiant heater but in being complementary to it. The idea of the new approach to the heating load is to supplement the gas fire with small heating units burning gas fluelessly at exceedingly low rates. Small units, upon which a great deal of research has been expended, will be available having a gas rate of 4 to 6 cu.ft. per hour for medium-size rooms. These neat units are designed to fit on the wall at skirting height, and the most suitable location will normally be underneath a window, this being the point where background heating is likely to be most effective. The aim is to provide throughout the room and near the windows comfort conditions virtually as satisfactory as near the fire, and such as to allow the window to be open to ensure fresh air supply. Obviously all gas used through the medium of these low-rate units will be employed at the maximum overall thermal efficiency, which efficiency will be equivalent to a reduction in the price of gas by something like one-half. Where attractive two-part tariffs are in operation this low gas rate air-heating represents a type of heating which cannot be countered from the cost point of view by any form of competition.

We suggested that, judiciously employed, this supplementary air heating by gas offers a very large potential load and would permit of the gas fire being used to better advantage. We are not surprised, however, that the notion of employing a form of gas heating which allows the products of combustion to pass into the room should have given rise to a certain amount of questioning. Past experience with flueless gas heating has not been uniformly happy, but that flueless heating is on quite a different footing from what is envisaged by background heating at the exceedingly low and controlled gas rates mentioned. This heating involves a gas consumption corresponding to that employed for domestic lighting. The products of combustion will be no more than from lighting burners—an amount surely beyond criticism where gas quality is at all reasonably controlled. If we cannot feel happy about the products from these small unit heaters, can we remain satisfied with gas lighting, the products of combustion of which, due to air movement, distribute themselves more or less uniformly throughout the room? Gas lighting is in effect a form of background heating, and there is plenty of evidence to show that this measure of heat is widely appreciated. From experience we know that gas lighting in a cold hall is a very real aid to comfort.

Background heating will, of course, prove a failure if it gives rise to any discomfort conditions of the atmosphere of a room; if, for example, the consumer becomes aware of even the faintest tang in the air due to sulphur.

But attention is being increasingly paid to the elimination of sulphur from gas, and at the low gas rates which are the essential feature of this form of heating to take the chill off the air, and the application of which goes hand in hand with a radiant fire which ventilates the room, it would seem that the idea merits trial.

Equipment of Working Class Flats

In July of 1934 the Minister of Health appointed a Departmental Committee " to enquire into and report upon materials and methods of construction suitable for the building of flats for the working classes, with special reference to efficiency and cost." This Committee issued an interim report in 1935 and the final report has just been published. The Committee have operated through Sub-Committees, and though not within their terms of reference have studied the question of lighting, heating, cooking, and hot water supply through a small Sub-Committee. It will, we think, be agreed that this is a considerable problem, and it is extremely difficult for us to understand why, with the main subject sufficiently wide in itself, the Departmental Committee appointed to enquire into it should have strayed beyond the terms of reference to delve into another problem of such magnitude. The report does not tell us how the Sub-Committee on Equipment worked, how the evidence was taken, or what organizations and private individuals were consulted, but the " general views " on lighting, heating, cooking, and hot water supply expressed in this final report on the construction of flats for the working classes are naturally of interest to the Gas Industry.

It is obvious from the report that the Committee, having lightly embarked on this self-imposed task, found the problem increasingly perplexing as time went on, and found it increasingly difficult to frame recommendations. The Committee maintain that there is need for exact and impartial research into the economics of fuel consumption in working class dwellings and into the efficiencies of the various systems having regard to the varied needs of the population in the different parts of the country and the scale on which the services are to be provided. The Gas Industry would, we think, welcome such research; it would have everything to gain and nothing to lose by it. Not surprisingly the Committee admit that it would be beyond their scope to attempt such research, and they therefore content themselves with a general review based on such information as they have collected.

In regard to lighting, because there are no products of combustion from electric lamps, the Committee recommend that electric lighting be adopted, but this recommendation is qualified by the condition that the price of electricity for lighting must not be excessive as compared with that of gas. The extraordinary statement appears: " We know of no proof, however, that the small amount of products of combustion emitted from gas lighting units as used in dwelling houses is of any measurable harm to the health of the average individual." Of course they know of no proof; and in this regard we would call the attention of the Committee to the report issued this year by the Advisory Committee appointed by the President of the Royal College of Physicians on the significance to health and comfort of the use of flueless gas appliances. On the question of cooking equipment, the Ministry of Health Committee conclude that, pending the introduction of cheap insulated ovens using solid fuel, cooking by gas or by electricity should be encouraged, and that the choice between the two methods can only be made after consideration of the comparative local charges. Does this imply that, if a cheap insulated oven using solid fuel is introduced, gas cooking should no longer be encouraged? And in regard to gas and electric cooking, have the Committee taken into consideration the insistent demand for gas hotplates by working class tenants who have learnt through bitter experience the drawbacks of electric cooking? It is not only a matter of cost, though we know gas to be cheaper than electricity; it is also a matter of speed and convenience.

The Convenience Factor

Discussing the practice of combining heating, cooking, and hot water service by the use of the kitchen range, the Committee are of opinion that this should not be generally encouraged where the heat from the fire would produce uncomfortable conditions during the summer months. It what circumstances, however, in small working class flats would the heat from the fire not prove uncomfortable? The need for cooking and the demand for hot water do not diminish during the summer months. In any case the inconvenience of the combined range necessitates the use of auxiliary equipment for boiling water quickly. Another conclusion drawn by the Committee is that the independent solid fuel boiler is satisfactory where the quantity of hot water required is about 300 gallons per week, but that where tenants are satisfied with half the quantity of hot water gas or electric water heaters can be so controlled as to allow of economical use in most districts. We have no quarrel with this except to suggest that the Committee are optimistic when they say that in most districts the provision of 150 gallons of hot water each week would prove economical to the average working class household.

Regarding the Committee's report as a whole, we think that insufficient stress is laid on the convenience factor, and we regret the omission of reference to the desirability of rendering new blocks of working class flats smokeless. We would call the attention of the Committee to the recently erected estate of working class flats at Kensal Rise opened a few months ago by the Minister of Health, Sir Kingsley Wood, who described the estate as a " modern miracle." The Gas Light and Coke Company were responsible for the erection of Kensal House, as this new estate is named, but it was built in strict conformity with the terms of the Housing Acts as to permitted areas, financial arrangements, and choice of tenants. In all respects it is comparable economically with other publicly operated housing schemes, and rents have been fixed at a level adequate to cover costs, including the return on capital borrowed. The flats are let at 11s. 6d. a week, including rates, for the five-room (three bedroom) flats and 9s. 6d. for the two bedroom type. This estate is entirely smokeless. The equipment consists of an open coke fire, gas ignited, in the living room, a gas fire in the principal bedroom, with gas points in the smaller bedrooms, an enamelled cooker fitted with automatic oven-heat control, a wash-copper, a point for a gas iron, and a multi-point instantaneous water heater which supplies the sink, copper, and bath. The lighting is by gas and is switch-controlled. This service, which offers all the amenities that a reasonable middle-class family might demand, is being enjoyed by working class families at a running cost within their means. This practical example of what can be done must surely be of the utmost interest to the Departmental Committee of the Ministry of Health.

Personal

At the annual meeting of the Coatbridge Gas Company on Sept. 14 Mr. JAMES TENNENT was elected to the Board to fill the vacancy occasioned by the death of Mr. Hugh S. Davie.

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Mr. J. H. BINGHAM, General Manager of Metropolitan Gas Meters, Ltd., and Cheltenham Meters, Ltd., has been elected for a second year Chairman of the Council of the Institution of Production Engineers, of which Institution Lord NUFFIELD succeeds Lord Sempill as President.

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Lieut.-Col. J. O. SHEPHERD, who is Commanding Officer of the 76th Highland Field Brigade (T.A.), which has reached the final of the King's Competition for horse, field, and medium artillery, is a Director of Henry Balfour & Co., Ltd., Gas Engineers and Ironfounders, of Durie Foundry, Leven.

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The Directors of Robinson Brothers, Ltd., and the Midland Tar Distillers, Ltd., recently presented an inscribed silver salver to Mr. C. H. SHAW on the occasion of his retirement after 25 years' service. The Directors of the Midland Tar Distillers, Ltd., also presented an inscribed silver salver to Mr. JAMES E. WILLIAMS, their Head Buyer, in recognition of over 50 years' service.

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Some months ago Mr. W. R. GORDON, the Director of the Coal Utilisation Council, drew up plans for the expansion of the Council's work. These plans, which contemplated a considerable development of the Council's activities, and inevitably involved the expenditure of larger funds, were approved in principle by the Council, which was, however, faced with the problem of raising the necessary additional revenue. It recently became apparent that the efforts made with this object could not be immediately successful, and that the proposed expansion must therefore be postponed. In these circumstances Mr. Gordon felt that he had done all that was possible and that in fairness to the C.U.C. he should tender his resignation as Director. The Council was naturally reluctant to lose his services and asked him to reconsider his decision, but after consideration Mr. Gordon felt unable to do so and the Council has accordingly accepted his resignation with much regret. The resignation will probably take effect early in the New Year.

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Miss JOAN MEDCALF, daughter of Mr. Tom Medcalf, Vice-Chairman of the Swindon United Gas Company, was recently married at the Parish Church, Swindon.

Obituary

Mr. J. H. Sillitoe.

The death occurred on Saturday at his home in Chorlton-cum-Hardy of Mr. James Herbert Sillitoe, the Commercial Manager and Secretary of the Manchester Corporation Gas Department.

He entered the service of the Manchester Corporation as a boy of 15 in 1900. In 1912 he was appointed principal assistant in the statistical office of the Gas Department. In 1918 he became personal assistant to the Superintendent, in 1920 Assistant Secretary, in 1923 Secretary, and in 1928 Commercial Manager and Secretary. During his 37 years' service with the Corporation Mr. Sillitoe filled many important posts in the Gas Industry. He was appointed in 1919 Hon. Secretary of the North-Western Area of the National Gas Council, and he took a prominent part in the negotiations which led to the settlement of the gas strike of 1920.

During the general strike in 1926 he was entrusted by 68 gas concerns in the north-western area with the task of purchasing sufficient coal to keep them at work. A great part of the 387,000 tons which comprised the purchase Mr. Sillitoe obtained from the United States, sixty vessels being specially chartered as transport. This valuable service was acknowledged in an illuminated address.

Mr. Sillitoe, who had been seriously ill for some weeks, was 52 years of age. He leaves a widow and one daughter. A service was held at St. Werburgh's Church, Chorlton-cum-Hardy, at 1.30 p.m. to-day, prior to interment at the Southern Cemetery, 2.30 p.m.

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The death occurred on Sept. 15 of Mr. STANLEY RAINER, who had been in the service of the Oriental Gas Company, Ltd., for the past 48 years, of which he had been Secretary for the last 21. His devotion to the Company's interest is shown by the fact that he died in harness, although for the past eighteen months his health had been very indifferent. His loss is deeply felt by all in the Company. He leaves a widow and four daughters to whom everybody who knew Mr. Rainer will extend their sympathy. The funeral took place at Sutton Cemetery on Monday.

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We regret to announce the death of Mr. JOSEPH STOKES, for many years Outside Superintendent Erecting Engineer for Messrs. Ashmore, Benson, Pease, & Co., Ltd., of Stockton-on-Tees.

In This Week's "JOURNAL"

Gas for Greenhouse Heating.

With the prospect of colder weather ahead, the thoughts of garden-lovers will be turning in the direction of suitable methods of warming their greenhouses. Gas provides the most reliable means known for this purpose, and an illustrated article this week gives particulars of a well-known system, together with details of a typical installation.

See p. 738.

New Carbonizing Plant for Newport (I.o.W.).

A new installation of Drakes vertical retorts, together with additional ancillary plant, was officially inaugurated by Mr. Thomas Carmichael (Deputy-Chairman and General Manager of the Portsmouth and Gosport Gas Company) on Sept. 20, at Newport, the oldest town in the Isle of Wight. Following the inauguration, a luncheon was held to mark the event, Mr. A. W. Oke (Chairman of the Newport Company) presiding.

See p. 739.

Gas at the Engineering Exhibition.

Once again gas plays a prominent part at the Engineering and Marine Exhibition which is running at Olympia until Oct. 2. A fine display by the British Gas Federation represents the industrial side of the Gas Industry's service as a whole, while a number of firms well known in the Industry have interesting stands.

See p. 741.

Wales and Monmouthshire Association.

Record attendances all round were marked in connection with the Autumn Meeting of the Wales and Monmouthshire Association of Gas Engineers and Managers, which took place on Wednesday and Thursday of last week at Porthcawl. No better place could be found within the area of the Association for a September meeting, and it is not surprising, therefore, that the gatherings there gain in popularity with the passing of the years. In the course of the meeting an important discussion took place on the subject of the coal situation.

See p. 742.

Evaluation of Coal.

The Paper presented at the Meeting of the Wales and Monmouthshire Association was by Mr. W. R. Branson, of the Cardiff Gas Light and Coke Company, his subject being the evaluation of coal for gas manufacture. The Author shows the limitations of assay methods and puts forward a plea for more full-scale testing of coals, and, what is equally important, for expressing the results of tests in terms of cash value. Failure to translate the laboratory report into commercial terms is to waste much of the efforts of the chemist and research worker.

See p. 747.

Domestic Central Heating.

At the North British Meeting Mr. David Fulton read a Paper on Domestic Central Heating. In this he gives actual figures of consumptions already obtained from a variety of types of installation which serve to remove uncertainty and guesswork from the matter. The Author considers that the development of a domestic central heating load is unlikely to be a spectacular growth, but rather to be slow and gradual; that its character as a variable winter load makes it better so and renders it undesirable to offer exceptionally low gas rates; that the quantity which any individual consumer can possibly use makes it commercially unsound to do so; that the running cost of gas fuel except in very specially favourable circumstances must considerably exceed the cost for solid fuel; and that in putting forward propositions frankness and candour are imperative.

See p. 750.

Showroom Construction and Design.

The other Paper at the Meeting was by Mr. J. Wilson, who dealt with the design and construction of the Dundee Gas Showrooms. Special attention was directed to the desirability of being able to demonstrate all types of appliance under working conditions, and an account is given of the system of ventilation installed.

See p. 758.

CORRESPONDENCE

Gas-Works and the Landscape

SIR,—After viewing while on holiday various gas-works in the country and at the seaside, I would like to stress the general desirability of doing something to make gas-works harmonize with their surroundings, now that the public is becoming more alive to the preservation of the countryside, and to town and country planning.

At two well-known seaside resorts the gas-works, neat in themselves, appeared in the landscape as painfully conspicuous blots in an otherwise particularly fine view. Probably most of us know of many small towns and villages where the gas-works appear completely out of harmony with their surroundings. Such prospects produce an antagonistic impression in those who look on them, and no industry which desires to be thought progressive and up to date can afford to have its works regarded as blots on the landscape.

The Gas Industry is particularly unfortunate in that its plant is often unusually tall and prominent and also, unlike other chemical works, widely dispersed throughout the whole country. The Industry is therefore especially vulnerable to charges of despoiling the countryside, &c.

The most obvious method of bringing a works into harmony with its surroundings is to set trees among and around the plant, so as to form a setting or a screen for the works. Poplars are probably the most suitable, being hardy and rapid-growing. The Lombardy variety grows to a great height fairly rapidly and could be planted near the holders or vertical retort houses (this variety might not stand the smoke from horizontals), and the Ontario poplar, which grows with surprising vigour and rapidity even in smoky towns, could be used to complete the picture. Both these varieties of poplar are low in price. (As some of the smaller-leaved poplars are comparatively slow-growing it may be mentioned that the rapid-growing Ontario variety suggested has very large glossy leaves, about 5 to 7 in. across and from stem to tip when full grown. It stands pruning and may be made into huge bushes if desired.)

Although the trees would not hide the taller parts of the plant at least for many years, they would soon break the harsh outlines and very much improve the general appearance and reputation of the works.

Yours, &c.,
H. F. TAYLOR.

Lyme Road,
Disley, Cheshire.
Sept. 18, 1937.

News in Brief

CURRENT EVENTS IN THE GAS INDUSTRY

Gas in Preference to electricity for the lighting of High Street, Saltcoats, was the decision of the Town Council on Sept. 13.

An Indoor Bowling Green being laid down at Lewisham is to be equipped by the South Metropolitan Gas Company with both heating and lighting.

A Reduction in the price of gas by 2½d. per 1,000 cu.ft. after the September survey is to be recommended by the Gas Committee to the Ardrossan Town Council.

Polar Bears eating monster cornets of ice-cream were featured on the refrigeration display entered in the recent Hastings Carnival by the Hastings and St. Leonards Gas Company, which was successful in winning a first prize.

For the Public Lighting of Henley-in-Arden it has been decided by the Local Council to accept the tender of the Henley-in-Arden Gas, Coal, and Coke Company in preference to that of the Birmingham Electric Supply Department.

An Interim Dividend has been declared by the Directors of the United Kingdom Gas Corporation, Ltd., on the ordinary shares of 2%, payable Oct. 16. Last year's interim was also 2%, and was followed by a final of 3%. The £1 ordinary shares are now quoted around 21s.

Applications are Invited by the South Australian Gas Company (Adelaide) for the position of Technical Gas Salesman. Further particulars of the position, which carries a commencing salary of £550 (Australian currency) rising to £900, will be found in the advertisement columns of this issue.

We Have Received from the Principal of the Westminster Technical Institute, Dr. J. N. Long, a copy of the prospectus for the session 1937-38, which commences on Sept. 27. This, together with information on other courses, gives details of the courses in gas fitting, engineering, and supply.

New Records in gas output were reported by the Engineer and Manager, Mr. James Jamieson, at a meeting of the Public Utilities Committee of Edinburgh Town Council on Sept. 17. There has been an increase of almost 7% since May, or over 50 million cu.ft. more than sent out during the same period last year. Notwithstanding the difficulty in obtaining steelwork and refractory materials, the extension of the vertical retort installation at Granton had been completed, and was now in operation. This unit increased the productive capacity of the works by 25%.

At the Birmingham Works of Messrs. W. Parkinson & Co. presentations were recently made to Mr. G. Bullock, meter maker, who has retired from the service of the Company after 58 years' continuous service, by his employers and shop-mates. Mr. Bullock commenced work at the age of thirteen.

The Trade Revival on the North-East Coast and the trading estates experiment is the subject of a booklet recently published by the North-Eastern Trading Estates, Ltd., Metrovick House, Northumberland Road, Newcastle-upon-Tyne. The booklet is a consensus of opinion reprinted from the *Statist*, the *Economist*, the *Financial News*, *The Times*, *Business*, and the *Architects' Journal*.

Application to the Board of Trade is intended to be made under Section I. of the Gas Undertakings Act, 1929, by the Dudley, Brierley Hill, and District Gas Company for an Order increasing the powers of the Company to borrow on mortgage of the undertaking or by the issue of debenture stock to an amount not exceeding 75% of the paid-up share capital of the undertaking for the time being and of any premiums paid in respect thereof.

The Popularity of Gas for Flats is indicated by two recent installations by the South Metropolitan Gas Company. In one case seventy-two new flats at Grove Park are being equipped with multi-point water heaters and panel fires, while in another block at Blackheath gas refrigerators and panel fires are being fitted, the whole of the domestic hot water is supplied from a central coke boiler.

One Hundred Thousand Copies of a brilliantly illustrated brochure, showing at a glance the immense variety and range of products assembled in London and Birmingham for the British Industries Fair, will shortly be distributed to importers in more than 100 Empire and foreign markets. This guide is printed in nine languages and gives all the relevant facts relating to the 1938 Fair to be held from Feb. 21 to March 4.

The Directors of the Malta and Mediterranean Gas Company, in a circular to stockholders, recommend that the issued capital of the Company be reduced by two-fifths by return of capital. In addition to the return of £40 capital in cash, holders of each £100 Ordinary stock are to receive a cash premium of £24. The premium in the case of the First and Second Preference stocks is to be £14. The issued capital is £123,065 in £75,000 Ordinary stock, £30,000 7% First Preference stock, and £18,065 7½% Second Preference stock.

The Institution of Chemical Engineers are holding a joint meeting with the Society of Chemical Industry (Newcastle Section and the Chemical Engineering Group), Institute of Chemistry (Newcastle and North-East Coast Section), Coke Oven Managers' Association (Northern Section), and the Institute of Fuel in the Chemical Lecture Theatre, Armstrong College, Newcastle-upon-Tyne, on Friday, Oct. 8, at 7.45 p.m. The Chair will be taken by the President of the Institution, Dr. William Cullen, and Dr. P. O. Rosin will read a Paper on "The Influence of Particle Size in Processes of Fuel Technology."

The Favourable Reception given to the first edition of "Combustion in the Boiler Furnace," by Mr. H. J. Hodsman, M.B.E., M.Sc., F.I.C., Lecturer in Gas Chemistry at Leeds University, has prompted the publication of a second edition, of which we have received a copy. Opportunity has been taken to make certain additions and alterations, to refer to the use of gaseous fuel, and to elaborate the treatment of flue gases. Experience has shown that the influence of composition of flue gases on efficiency offers greatest difficulty to those students for whom the book was written—namely, those students preparing for certification as stokers and boiler attendants under the scheme of the West Riding Regional Smoke Abatement Committee.

Amalgamation and Grouping

Gas Consolidation and Uttoxeter.

The Directors of Gas Consolidation, Ltd., announce that their recent offer to the shareholders of the Uttoxeter Gas-Works, Ltd., has been accepted by the holders of a substantial majority of the share capital of that Company.

South-Eastern and Windsor.

The Directors of South-Eastern Gas Corporation, Ltd., announce that the recent offer to the shareholders of the Windsor Royal Gaslight Company has been accepted by a substantial majority.

Tottenham and Southgate.

Application is to be made by the Tottenham and District Gas Company to the Board of Trade for a Special Order to acquire the undertaking of the Southgate and District Gas Company.

United Kingdom and Northwich—

Close Brothers, Ltd., Secretaries of the United Kingdom Gas Corporation, Ltd., announce that the Corporation has just completed the purchase of over 90% of the ordinary and preference capital of the Northwich Gas Company, which adjoins the group of gas undertakings in Cheshire and South Lancashire already owned by the Corporation. Over 70% of the purchase consideration for the Northwich Gas Company was satisfied by the allotment of 4½% first cumulative preference and ordinary shares of the Corporation.

—and Bedford.

It is also announced that the Corporation's recent offer made to the ordinary stockholders of the Bedford District Gas Company, although not yet completed, has already been accepted by holders of more than 75% of the stock. Completion of this purchase will be effected at the end of September.

Public Lighting of Calcutta

Extract from the *Morning Post* for Sept. 16:

> "Political agitation, busy for many months, has culminated in a serious threat to the life of Calcutta. Encouraged by outside influences, workers at the power stations of the Calcutta Electric Supply Corporation, which gives power and light to the whole of Calcutta and its suburbs, have delivered an ultimatum that unless their demands are met by Saturday they will strike. If this strike were successful, it would paralyze industry, and the city would be plunged in darkness and deprived of its filtered drinking water, trams, and entertainment."

Extract from the speech of the Chairman of the Oriental Gas Company, Mr. B. W. Ellis, at the Annual Meeting of the Company, Nov. 19, 1936 ("JOURNAL" for Nov. 25, 1936):

> "During the year 170 new public lamps have been fixed, so that we now light over 19,000 public lamps."

New Plant for Hamilton

Benzole Plant and Gasholder

It was reported at a meeting of the Hamilton Town Council on Sept. 14 that there had been submitted to the Gas Committee figures showing the cost of installing and working a benzole recovery plant. The estimated cost of erection would be £3,090. The estimated revenue was £3,363, against an estimated expenditure, taking the period of repayment of capital at eight years, of £2,646, leaving a net estimated profit of £717 per annum. The Committee had recommended that the proposal be agreed to, but that the period of repayment of the capital sum be five years. The Council approved the recommendation.

It was also intimated that the Engineer and Manager, Mr. J. B. Ferns, had reported to his Committee that one of the gasholders, built in 1894, was getting into a dangerous condition, and he recommended that it be scrapped and estimates taken for its replacement. He explained that the holder to be erected would have a capacity of 500,000 cu.ft. and would cost approximately £17,000. On the assumption that repayment of capital would be spread over a period of 15 years, the annual charge would be £1,423. The Committee approved the measure.

A desire was expressed by ex-President Souter and others to have an independent expert's opinion on the condition of the old holder, all the members agreeing that the question of safety must be the first consideration, and the Convener agreed to take the matter back for a month for that purpose.

Forthcoming Engagements

Sept.

23.—S.B.G.I.—Council Meeting, 11 a.m.
24.—I.G.E.—Joint Lighting Committee, 2.30 p.m.
26-29.—B.C.G.A.—Annual Conference at Manchester.
30.—I.G.E.—Gasholder Committee, 2.30 p.m.
30.—I.G.E.—Gas-Works Safety Rules Committee, 3.30 p.m.

Oct.

1.—I.G.E.—Liquor Effluents and Ammonia Committee, 11.15 a.m.; Joint Research Committee, 2.30 p.m.
2.—MANCHESTER JUNIORS.—Annual General Meeting at Manchester.
5.—I.G.E.—Research Executive Committee, 2.30 p.m.
5.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—Commercial Meeting at Gas Industry House, 2.30 p.m. Discussion on Gas Mixing. Committee Meeting, 12 noon.
7.—I.G.E.—Joint Committee on Complete Gasification under Pressure, 3 p.m.
7.—SOUTHERN ASSOCIATION.—Meeting of General Committee, Gas Industry House, 2.30 p.m.
8.—NORTH OF ENGLAND ASSOCIATION.—Autumn Meeting at Willington.
9.—SCOTTISH WESTERN JUNIORS.—Meeting at Glasgow. Presidential Address of R. A. MacLaren (Newton-on-Ayr).
12.—I.G.E.—Board of Examiners, 10.30 p.m.
13.—I.G.E.—Finance Committee, 9.30 a.m.; Membership Committee, 10 a.m.; General Purposes Committee, 11 a.m.; Benevolent Fund Committee of Management, 12.30 p.m.; Council, 2.30 p.m.
13.—COKE SALESMEN'S CIRCLE.—Meeting at Gas Industry House, 2.30 p.m.
14.—EASTERN COUNTIES ASSOCIATION.—Autumn Meeting at Bedford.
19.—I.G.E.—Gas Education Executive Committee, 11 a.m.; Gas Education Committee, 2.30 p.m.
23.—SCOTTISH WESTERN JUNIORS.—Visit to Paisley Gas-Works.
26.—B.C.G.A.—Eastern District Conference at Lincoln.
27.—B.C.G.A.—Northern District Conference at Darlington.
28.—COKE OVEN MANAGERS' ASSOCIATION.—Annual Dinner, Hotel Victoria, London.

Nov.

2.—I.G.E.—Council, 9.30 a.m.; Council (*continued*), 4.30 p.m.
2 and 3.—I.G.E.—Autumn Research Meeting.
3.—BRITISH GAS FEDERATION.—Annual General Meeting and Dinner, Grosvenor House, Park Lane, W. 1.
19.—SOUTHERN ASSOCIATION.—General Meeting, Hotel Victoria, 2.30 p.m. Paper by W. A. Bishop (Croydon) on "Large-Scale Heating by Gas." Committee meeting precedes at 12 noon.

Eastern Counties Association

Annual Meeting at Bedford

The Autumn Meeting of the Eastern Counties Gas Engineers' and Managers' Association will be held in the Social Club Hall of the Bedford District Gas Company on Oct. 14.

Following the business meeting the members will have the opportunity of inspecting the Bedford Gas-Works, after which lunch will be provided at the Swan Hotel at the kind invitation of the Managing Director of the Le Bas Tube Company, Ltd., whose works the Association will be visiting during the afternoon.

National Gas Council

Meeting of the Central Executive Board

A meeting of the Central Executive Board of the National Gas Council was held at Gas Industry House, 1, Grosvenor Place, S.W. 1, on Tuesday, Sept. 14, 1937, at 2.30 p.m.

In the absence of Sir David Milne-Watson, Bart., LL.D., D.L., the Chair was taken by Councillor G. H. KITSON, a Vice-Chairman of the Board.

The following among other matters were considered:

1. *The Publication by The Institution of Gas Engineers of Regulations governing the Installation of Gas Service Pipes, Gas Supply Pipes, and Gas Appliances.*—It was reported that the Committee which was appointed in 1936 to draft Model Regulations regarding this matter had reported in June last to the British Gas Federation. The British Gas Federation had approved the Report, subject to any amendments which might be proposed by The Institution of Gas Engineers. The suggestions made by The Institution of Gas Engineers had been accepted by the drafting Committee, and the Regulations had been issued early in August. The demand for copies had been so great that the first edition had been exhausted, and a further issue was now awaited.

2. *Railway Rates.*—A Report was issued regarding the Judgment of the Railway Rates Tribunal with respect to the recent application by the four amalgamated Railway Companies for authority to make an increase of 5% in all railway rates and charges. In their judgment, the Tribunal had confirmed the application of the Railway Companies, subject to the Fraction Rule, under which any increase being less than ½d. was to be disregarded. The increase as applied to the coal, coke, and patent fuel class of traffic would operate as follows: On all existing charges not exceeding 2s. 5d., an increase of 1d.; on charges over 2s. 5d. but not exceeding 4s. 1d., an increase of 2d.; on charges of over 4s. 1d. but not exceeding 5s. 10d., an increase of 3d.; and thereafter advancing by 1d. for each additional 1s. 8d. in the existing chargeable rate. The operation of the Fraction Rule would prevent any increase in a charge not exceeding 10d.

3. *Egham and Staines Electricity Company, Ltd.*, v. *The Gas Light and Coke Company.*—The judgment of Mr. Justice Farwell delivered in the above action on July 19 last was reported.

The action was an application for an injunction by the Egham and Staines Electricity Company to restrain the Gas Light and Coke Company from supplying to electricity consumers in the Egham and Staines area gas hotplates, which were frequently placed upon the electric cooker. The application for the injunction was refused, and judgment was entered for the Gas Light and Coke Company, with costs.

In his judgment the Judge had pointed out that both Gas and Electricity Companies were statutory bodies having privileges and correlative obligations, and that the public had an undoubted right to determine for themselves whether they would use gas or whether they would use electricity. He stated that this right had been recognized by Parliament, and was to be found in statute law. The Court would not, therefore, be disposed to favour methods adopted purely out of commercial interests which did in fact deprive the public of their right of choice.

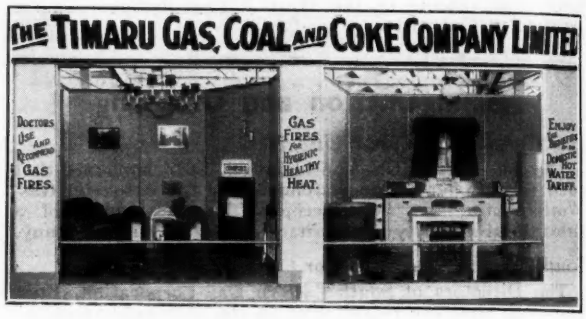
The Board considered that the judgment would be of the greatest assistance to the Industry, although it was announced that an appeal had been entered against it.

4. *Nomination of Representatives to serve on the Council of the British Gas Federation for the ensuing year.*—The Board decided to nominate those representatives who had served during the past year—viz.: Sir David Milne-Watson, Bt., LL.D., D.L., Mr. Wm. Cash, F.C.A., J.P., Mr. T. P. Ridley, F.C.I.S., Mr. C. S. Shapley, M.I.Mech.E., and Mr. A. W. Smith, F.C.I.S.

5. *Public Health (Drainage of Trade Premises) Act*, 1937.—It was reported that the Royal Assent had now been given to the above Act, under which traders were entitled as from July 1, 1938, to discharge effluent from their trade and manufacturing processes into sewers, subject to by-laws to be made by the Sanitary Authority and confirmed by the Ministry of Health.

The Ministry had now submitted model by-laws regulating the terms and conditions under which the discharge could be made, and had requested the opinion of the Industry regarding them. The Board decided that this matter should be submitted to The Institution of Gas Engineers, which had for many years dealt with the discharge of ammoniacal and liquor effluents.

6. *Invitation from the German Gas Association for the Council to be represented at their Meeting at Dusseldorf on Sept.* 21-23, 1937.—It was stated that many German Gas Engineers had expressed a strong desire to meet representatives of the British Gas Industry, and it was decided that Mr. Valon Bennett, who had already promised to represent The Institution of Gas Engineers, should be requested to represent the National Gas Council in addition.



June in South Canterbury, New Zealand, Mr. A. Morrie Taylor, Engineer and General Manager of the Timaru Gas, Coal, and Coke Company, Ltd., reminds us is the coldest month of the year and adds that the venue of the South Canterbury Industrial Exhibition and Winter Show is about the coldest spot in the town; the Gas Exhibit, being the only hot spot in the show, was, therefore, very popular. But surely Mr. Taylor is, in his modesty, not altogether fair to the drawing power of his undertaking's exhibit, to which we made reference in last week's issue. The stand was the subject of much favourable comment from such sources as Engineers from the Power Boards and the Municipal Electricity Undertaking, as well as from every member of the Show Executive and the general public. Above will be seen a section of the exhibit.

Attractive Lighting Fittings

Falk, Stadelmann's New List

A number of new and attractive lighting fittings are to be found in the recently issued new list of Messrs. Falk, Stadelmann, & Co., Ltd., Veritas House, 83-93, Farringdon Road, E.C. 1, who have not spared themselves in keeping abreast of the times. Pride of place is taken by the "Veritas-Diverta" burner, which although not entirely new has been included in the list. This burner has been produced considerably to reduce, if not altogether eliminate, the possible discoloration of fittings and ceiling. Its specifically designed flat top gallery and outlets tend to expel the products of combustion in a horizontal direction thereby not only mitigating the blackening of ceilings but giving, it is claimed, increased efficiency to the burner as the primary air intake is kept unadulterated. The "Diverta" is now available for universal and bijou sizes, both pendant and bracket forms.

The "Saturnlite" unit, it is observed, is obtainable either, as originally, with a 3-light bijou cluster or, now, with a 3-light No. 2 superheater, giving approximately 300 candle power. In the latter case, of course, the globe and ring plate are of somewhat larger diameter. Another new feature is the "Step-Saturnlite," the glassware of which is both pleasing and unusual. The "Veritas-Cubelite" unit is modern in appearance, its cube-shaped globe being obtainable in either plain opal or with coloured borderings. The "Hatton" and the "Clerkenwell" fittings have been specially designed for such purposes as the lighting of showrooms, restaurants, boardrooms, public halls, and similar premises. These two fittings are modern interpretations of contemporary design, being both dignified and effective.

Women's Gas Council

Summer School for Demonstrators

Below are described the social events and educational visits which did so much to contribute to the success of the Second Summer School for Demonstrators organized by the W.G.C. The events, however, occupied *in toto* but a small fraction of the time devoted to the Conference, during which time an ambitious programme of lectures and demonstrations was completed.

The "At Home."

"We have more than doubled our numbers!" was the justifiably proud boast of Miss K. M. Halpin in welcoming the representative of the "JOURNAL" to Gas Industry House, on Friday afternoon, when over a hundred delegates from gas undertakings all over the country attended the Second Summer School for Cookery Demonstrators by invitation of the Women's Gas Council. This year the course was held at King's College of Household and Social Science, Campden Hill Road, from Sept. 17 to 21, and an interesting range of lectures and visits had been prepared.

The delegates were warmly welcomed on behalf of the Executive Committee by Miss Wolseley-Lewis, and enjoyed both the renewing of acquaintanceships made at last year's School in Cardiff and an enthusiastic tour of inspection of the new building.

Guests of the Gas Light and Coke Company.

The delegates to the Summer School for Demonstrators organized by the Women's Gas Council were entertained at dinner at Grosvenor House, Park Lane, W., by the Gas Light and Coke Company on Friday. In the unavoidable and much regretted absence of the Governor of the Company, Sir David Milne-Watson, D.L., LL.D., the Chair was taken by Mr. R. W. Foot, O.B.E., M.C., the General Manager. Those present, including many distinguished guests, numbered almost 180.

Welcoming the delegates, Mr. Foot said the Gas Light and Coke Company were very pleased to have the opportunity of meeting them because they believed it to be an extremely important move in the direction of greater efficiency and happiness in the conduct of what was undeniably one of Britain's greatest industries, even though it might not figure in any official returns—viz., the making and running of homes.

Of the work of the demonstrator as technical expert and teacher, others who knew more than he would speak. What impressed him most was the bearing of their work on the lives of the women of the country. Referring to the servant problem, Mr. Foot said that of the various solutions which had been offered, perhaps the most spectacular was that which would make way for communal kitchens or the distribution of ready-cooked meals from door to door from central sources. This communal way of organizing domestic life appeared to suit the national temperament better in European countries, but in this country they were fighting to preserve the very deep-rooted institution of domestic service. With the steady growth of labour-saving machines and improvement of household planning and equipment the conception that domestic service is unskilled drudgery would pass and the domestic worker would achieve a new status.

The task of the demonstrator was to familiarize mistresses and maids with the idea of better planned kitchens and domestic offices and with the working of the implements and appliances which were essential to better planned homes. And then there was that very large number of housewives who tackled their domestic tasks single-handed. They, too, were learning—with the aid of the demonstrator—how to find more leisure, rid themselves of dirt, discomfort, and heavy household work, and put colour into their lives. One must view with the highest respect and the deepest admiration a work that was doing its full share in the abolition of a bad old state of things when a woman might spend—as investigation has shown many women did spend and some still did spend—60 hours a week, over 8 hours every day, in her kitchen.

Miss E. H. Horniblow, C.B.E., His Majesty's Inspector of Schools, replied on behalf of the guests.

The toast of "The Women's Gas Council" was proposed by Sir Isidore Salmon, C.B.E., J.P., D.L., M.P., Managing Director of Messrs. J. Lyons & Co., who paid tribute to the great and important part gas played in the national life of this country. He did not, however, think that its potentialities were realized to a sufficient degree. He would like to see gas at an economic rate obtainable for industry in its widest sense; it should be made possible for large steam-raising plants, glass-works, enamelling works, laundries, and bakeries to be fuelled completely by gas instead of by coal or oil. Training of teachers in domestic science was a science that modern life tended rather to neglect, and good plain cooking was not learnt by many brides of to-day. The Women's Gas Council supplied a very real need in that it was a representative organization for the millions of women who used gas in their homes. The multifarious activities of Mr. Therm could hardly be numbered.

Replying to the toast, Miss Wolseley Lewis, Chairman of the Women's Gas Council, thanked the Gas Light and Coke Company for the great assistance they had given to the Council. They now had thirty-four branches, but when one remembered there were over twelve hundred gas undertakings in Great Britain it would be seen there was yet a tremendous amount of work to be done.

"Our Hosts" was charmingly proposed by Sir H. Russell Bencraft, L.R.C.P., M.R.C.S., J.P., Chairman of the Southampton Gaslight and Coke Company, who expressed the regret of all at the absence of Sir David, the great leader of the Gas Industry. In Mr. Foot, however, they had a very able deputy. Mr. Foot briefly responded.

The dinner was followed by an excellent variety entertainment, at the conclusion of which all joined heartily in the singing of "Auld Lang Syne."

On the afternoon of Sunday the delegates had the choice of visiting Hampton Court or the Royal Zoological Gardens or attending an indoor entertainment at the London Palladium on the kind invitation of Messrs. R. & A. Main, the Parkinson Stove Company, and Radiation Ltd., respectively, whose kind co-operation contributed to a most enjoyable afternoon.

There were three visits on Monday afternoon. These were to the works of the Ascot Gas Water Heater Company at Neasden, the Luton works of Electrolux, Ltd., and to the works of Messrs. Radiation Ltd. at Luton. After the visit to the Ascot Gas Water Heater works the visitors were entertained in the works canteen to tea. Welcoming the delegates, Dr. Bernard Friedman, Managing Director, said he wished to thank the Women's Gas Council for arranging the visit. After drawing attention to the competition from electricity in the storage water heating field, Dr. Friedman went on to say that on the basis of an eight-hour day the demand for the instantaneous gas water heater was so great that at present they were making and selling appliances at the rate of one per minute. He was sure that this demand would be continuous.

Miss A. M. Mathias, of the Cardiff Gas Light and Coke Company, replied on behalf of the delegates, adding that, until she had seen the works of the Company, she had not realized the immense care and skill that went to the making of the "Ascot" gas water heater.

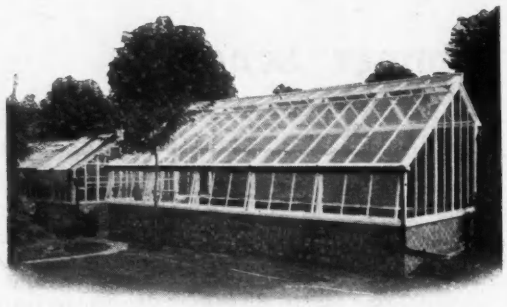
New Gas Meter Mechanism

To Record 4,000 B.Th.U. Units

Advocates of the small gas unit will be interested to learn that a recently patented gas meter design incorporates an arrangement whereby gas units of 4,000 B.Th.U. are recorded in addition to cubic feet and therms. The invention referred to is a new optional coin prepayment movement operated by 1d. or 1s. and is fully described in Patent Specification No. 469,608.

Another novel feature of this prepayment mechanism is that by simply transposing two wheels it is possible to adapt the mechanism to operate with the new nickel threepenny pieces. Mr. R. K. Gibson, of 1, Bangholm Park, Trinity, Edinburgh, is the patentee of the new mechanism.

Gas for Greenhouse Heating



A Reliable Method

With the prospect of colder weather ahead, the thoughts of garden-lovers will be turning in the direction of suitable methods of warming their greenhouses. Gas provides the most reliable means known for this purpose, and the following particulars are given of a well-known system, together with details and photographs of a typical installation.

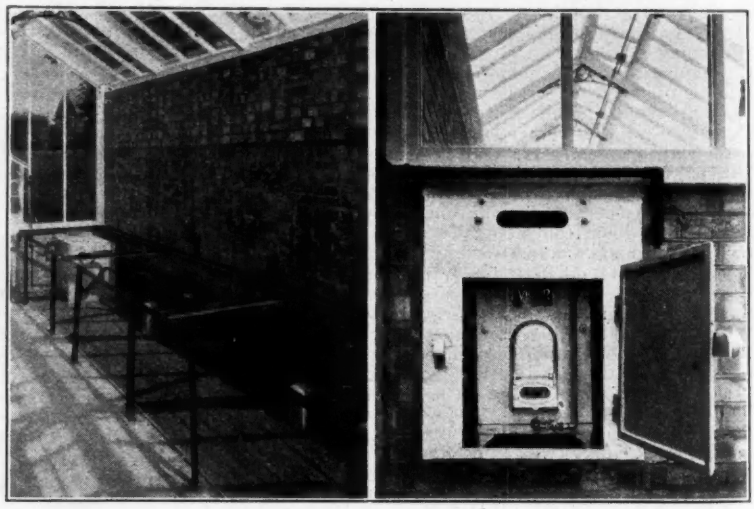
There is quite a useful little load for the Industry in the development of greenhouse heating. We refer rather to the private owner of one or a few greenhouses—the man whose gardening is his hobby—not the nurseryman or market gardener with acres of glasshouses, the heating of which calls for a somewhat different approach, though gas can also serve its purpose for heating these.

There are many owners of small greenhouses who would like to have some form of heating for the winter months but cannot adopt solid fuel through lack of the necessary supervision. With a gas-fired heating installation, however, gardening in all its refinements can be carried on in wintry weather with the most reliable results; exquisite plants and flowers can be grown for house decoration or for bedding out in the spring and early summer. The boiler can be left with perfect safety while the owner is away, without fear that many months' work may be ruined through lack of attention.

The accompanying photographs show a typical installation by Messrs. Thomas Potterton (Heating Engineers), Ltd., for Mr. Sabin, at Twickenham, representing the third of its kind the firm have carried out for him. The boiler in this case is a No. 20 "Victor," this apparatus being particularly suitable for low-pressure systems up to 180 sq.ft. Automatic control is effected by rod thermostats in conjunction with an air-temperature control. This boiler is rated at 80 cu.ft. per hour (500 B.Th.U. gas). It is fitted in a special enclosure, access to which is gained from outside the greenhouse. The openings form a balanced flue, and it is not generally necessary to fit a flue pipe. Such enclosures avoid any possibility of the products of combustion from the boiler entering the greenhouse.

This is one of the larger types of gas boiler for greenhouse heating. The firm supply other types, however, for smaller houses. Of these the "Spiral" heater is specially designed for simple fixing (without the necessity of a boiler enclosure) and is suitable for houses having a capacity of up to 1,500 cu.ft. where the temperature during the winter season has to be maintained at a minimum of 45° F., or for houses having a capacity of 800 cu.ft. at a minimum of 55° F. The flue is balanced at inlet and outlet, both being arranged for access and discharge outside the house, while the heated surface of the boiler is inside to supplement the heat from the pipes.

A useful catalogue on the subject of greenhouse heating has been issued by Thomas Potterton, Ltd., this giving particulars of the various boilers available and their ancillary equipment, together with valuable data upon heating capacities, dimensions, and estimated costs per hour at 6d. per therm.



The left-hand photograph shows the arrangement of the gas boiler and layout of the heating pipes inside one of the greenhouses belonging to Mr. Sabin, at Twickenham. On the extreme left, attached to the vertical frame, can be seen the automatic air temperature control. The right-hand photograph shows the Potterton No. 20 "Victor" boiler in its cast-iron enclosure as viewed from outside the greenhouse. This enclosure gives the effect of a balanced flue, and prevents any possibility of the products of combustion from the boiler entering the greenhouse.

Women's Gas Council

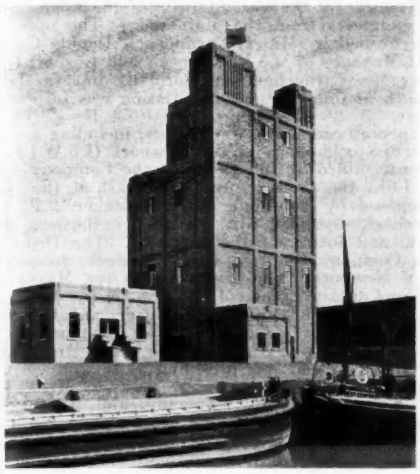
Manchester Branch Visit.

Over five hundred members of the Manchester Branch of the W.G.C. left Manchester in a convoy of 16 coaches to visit Port Sunlight on Sept. 15.

On arrival, they were conducted through the works and shown all the many processes which go to make a world-famous soap and at the souvenir stall each member was presented with a sample box of soap.

The next point of interest was the Lady Lever Art Gallery, where a delightful hour was spent. At 1 p.m. members assembled for lunch in the Hulme Hall Café, after which the coaches were rejoined once again for the party to be conveyed to the Docks *via* the Mersey Tunnel. Here the members boarded the S.S. "Samaria" for a tour of inspection at the end of which a delightful tea was served. The youngest member of the party was a three-months' old baby and one of the stewards proved himself an excellent nurse by carrying the baby round for the mother during the tour.

DRAKES VERTICAL RETORT INSTALLATION



Inaugurated

at

Newport (I.o.W.)

A new installation of Drakes vertical retorts was officially inaugurated by Mr. Thomas Carmichael (Deputy-Chairman and General Manager of the Portsmouth and Gosport Gas Company) on Sept. 20 at Newport, the oldest town in the Isle of Wight.

The site on which the Drakes vertical installation has been erected is adjoining the existing retort house, and is built on piled foundations. It is a steel framed construction, the panels being built in with 4½ in. multi-coloured bricks and the steelwork is also covered with 4½ in. multi-coloured bricks all set in cement mortar. Steel cased windows are built into the walls in positions to ensure sufficient lighting and ventilation in the retort house. The walls of the building are extended to form a parapet, a notable feature being the entire concealment of the chimney and overhead storage tanks.

Carbonizing Plant.

The new carbonizing plant comprises four settings of Drakes patent continuous vertical retorts, draughted on their new system of upward heating. Each setting contains two retorts in units of one, each chamber being provided with an independent gas and air supply with dampers and regulators grouped in the most convenient and accessible positions, which permit of the setting temperatures being easily regulated in accordance with varying throughput to meet the seasonable demands for gas. Each retort has a guaranteed throughput of 5 tons of coal per diem.

The retorts are Drakes 54 model and are constructed throughout the entire heating zone of Meltham toughened silica material, the combustion chambers and settings linings being of the same quality material.

All the walls are insulated with Moler non-conducting bricks, and sight boxes are arranged in the front walls at frequent intervals to permit of proper inspection of the temperatures throughout the length of the retorts. The twin producer is arranged on the ground floor at the front of the settings and is of ample capacity and fitted with Drakes patent hanging bar grates of large area, which minimize the formation of clinker and have proved to require very little attention.

The whole of the firebrick material used in the construction of the producers and settings is of the highest quality, and supplied by Messrs. John Morton & Co., Thornton, near Bradford.

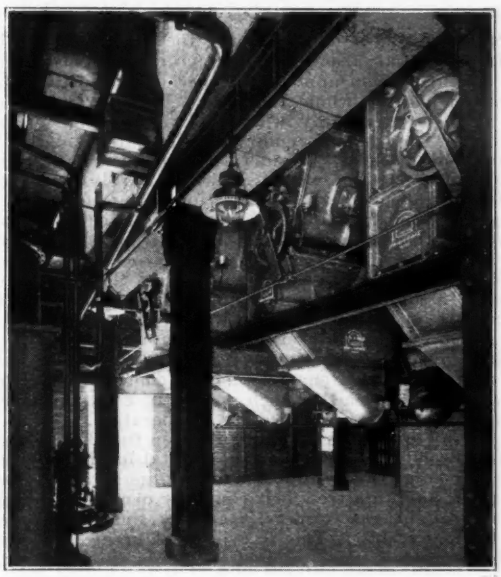
The plant is surrounded by spacious platforms arranged at convenient heights for inspection purposes, access to these being by easily graduated staircases. The coke chambers and extractors are of Drakes standard design, the discharging doors being of the self-sealing pattern. The throughput of each retort is separately controlled by a ratchet and mask device. Superheated steam is admitted into each retort through a specially fitted nickel bush device.

The governing of the gas evolved from the retorts is accomplished by a 10 in. Braddock patent retort house governor. All valves are easily accessible from the charging platform. A notable feature is the charging platform, which is exceedingly spacious, efficiently lighted, and remarkably cool, permitting the men to carry out their duties in an atmosphere of comfort.

Coal is brought to the receiving hopper over the elevator boot by a 20 in. band conveyor running from the existing coal store. Between the hopper and the elevator boot provision is made for fixing a coal breaker and jigger feed at some future time if desired. The elevator is Drakes standard 15 in. bucket type which delivers the coal on to a drag bar conveyor running over the top of the storage hoppers. The latter have a capacity of 48 hours' supply.

Waste Heat Boiler.

The waste gases leaving the combustion chamber of the carbonizing plant pass through a steel-cased insulated flue to a standard Spencer-Bonecourt waste heat boiler, having a heating surface of 660 sq.ft. and a working pressure of 120 lb., and fitted with a "Sirocco" induced fan, driven by a Greenwood & Batley steam turbine. The boiler feeding arrangement consists of a Weir duplex feed water pump. To supplement the waste heat



Ground Floor, showing Extractors, Coke Chambers, &c.

to the boiler at such times as the retort bench is not on maximum capacity an auxiliary producer is arranged on the ground floor and direct coupled to the main flue, whereby live producer gas can be fired with secondary air and passed to the boiler.

The water-softening plant is of the Lassen Hjort system, having a capacity of 300 galls. per hour. This is arranged on the ground floor on the same side as the auxiliary producer.

A steam lift is arranged at one end of the retort house and is provided as a passenger lift, and for the purpose of elevating the coke to the retort feed hopper at bunker level, and also to the producer feed hopper at stack level. The lift is of 25 cwt. capacity, the cage controls and gear-

ing being supplied by Messrs. E. A. Foulds, Ltd., engineers, Colne, and is fitted with positive locking gates. The power plant for supplying the lift is a Sissons 12 h.p. totally enclosed high speed steam engine.

The engine house for the extractor engines is built at one end of the retort house, and is of similar design and in keeping with the retort house. The extractor engines are in duplicate and are of Waller's exhauster type, steam driven.

A new exhauster house has been built adjacent to the new retort house. The house is built of multi-coloured bricks and is of similar design and in keeping with the retort house. There are two steam driven exhauster sets complete with by-pass mains which have been built upon a raised floor so as to give easy access to all connections underneath.

A Holmes' rotary scrubber (capacity 600,000 cu.ft. per day) was installed in 1934, the existing Holmes' rotary scrubber being used for benzole extraction, a plant for which was put down in 1935.

A Holmes' Connersville station meter (capacity 35,000 cu.ft. per hour) was installed in 1934.

The high-pressure plant comprises one Bellis & Morcom direct-coupled steam-driven compressor (capacity 25,000 cu.ft. of gas per hour against a pressure of 15 lb.) and two gas-driven sets which are now used only as stand-bys. Two Johnson-Reynolds single district governors have been erected, one at Carisbrooke, and the other in Medina Avenue, to augment the pressure in those districts.

Inauguration Ceremony.

The plant was inaugurated on Monday in the presence of a representative gathering of the gas interests of the Island and well-known gas engineers from the Mainland. The opening ceremony was performed by Mr. T. Carmichael, Deputy-Chairman and General Manager of the Portsmouth and Gosport Gas Company. After Mr. Carmichael had formally put the coal elevating plant into motion the new installation was inspected with great interest.

Following the opening ceremony, the visitors, including a considerable number of stockholders of the Newport (I.o.W.) Gas Company, were entertained at Luncheon by the Company and Messrs. Drakes, Ltd., the Contractors. The toast of the Gas Industry was proposed by Alderman F. E. Whitcher, J.P., to which Mr. Carmichael responded with his usual enthusiasm for the past, present, and future of the Industry. The Deputy-Chairman of the Company, Captain C. B. Pinnock, proposed "The Borough of Newport," and His Worship the Mayor of Newport, Councillor Captain Francis J. T. Mew, M.A., J.P., replied. Mr. S. E. Whitehead, Director, Engineer, and General Manager of the Southampton Gaslight and Coke Company, gave the toast of "The Newport Gas Company," to which Mr. A. W. Oke, who is its Chairman and was presiding at the Luncheon, replied. Finally "The Contractors" was proposed by Mr. F. E. Cox, Engineer and Manager of the Company, and Mr. M. T. Thompson, Managing Director of Drakes, Ltd., replied.

Industrial Gas Displays at Engineering Exhibition

Once again gas plays a prominent part at the Engineering and Marine Exhibition which is running at Olympia until Oct. 2. A fine display by the British Gas Federation represents the industrial side of the Gas Industry's service as a whole, while a number of firms well-known in the Industry have interesting stands.

Representing as it does not only the supply side of the Gas Industry but also the manufacturers of gas-making plant and utilization appliances generally, the British Gas Federation has the whole Industry behind it, and its exhibit at Olympia is fully worthy of the prestige of that Industry. The display embraces the latest and most striking conception of "standcraft," and, bearing in mind the type of apparatus exhibited—which hardly lends itself to pleasing display—the Federation has succeeded in arranging a most attractive show. Particularly noteworthy are the lighting effects on the front of the stand and the photographic freize, representative of the many phases of the Industry's activities, around the back of the display. In addition, the fact that many of the gas appliances are in operation gives a "live" atmosphere to the exhibit, while the very much improved finishes of industrial gas apparatus to-day, in their aluminium paint work or grey mottled enamel casings, conclusively dispels the old-fashioned idea that such apparatus must necessarily be dingy in appearance and dirty in operation.

One of the most interesting exhibits on the B.G.F. stand is a Greenwood & Batley 1½ in. horizontal forging machine shown in conjunction with a gas-fired forge furnace. Next to this is a small mattress belt conveyor oven furnace with natural draught gas burners, made by the Incandescent Heat Company, Ltd. This is typical of many now being installed on small mass production plants throughout the country.

In the working heat treatment shop visitors can have their own specimens heat-treated while they wait. The equipment consists of an Incandescent Heat 3 ft. by 2 ft. by 1 ft. "Super" natural draught oven furnace of the type now so popular in aeroplane and motor car works and wherever batch furnaces are required for hardening, carburizing, re-heating, or normalizing. The fact that a furnace of this size can be shown working without causing discomfort to people near it testifies to the thermal efficiency of the modern gas furnace.

The hardening of high-speed steel tools is an important process in almost every works, and the operating exhibit of a gas furnace is therefore of interest.

A natural-draught salt bath furnace is also to be seen. The pot itself is of interest because it is an exceptionally large hot pressing; and this process can only be applied where large quantities are required. The sale of these gas-fired pot furnaces has been so large that the bold step of producing these special pots in this way has been amply justified—to the great advantage of the user who has to pay far less for his pots than formerly.

Re-circulated atmosphere furnaces are "in the news" just now, and gas-fired furnaces of this kind are used in aeroplane and motor car works throughout the country for heat treating many of the new light alloys which have to be treated very accurately to give them the required characteristics. One of these furnaces is exhibited.

A new soft metal melting pot, also shown, gives in the larger sizes an overall working thermal efficiency of over 70%. The immersion burner system, which is made under licence from America, is known as the Holmes-Kemp system in this country, and makes use of completely premixed gas and air supplied by a blower to burners in mild steel tubes shaped like an inverted P and immersed in the metal to be melted. The hot gases circulate round the loop of the P and are finally discharged at the top of the tube into the space above the molten metal, thus forming a neutral atmosphere and decreasing the formation of dross. Judging from the results obtained so far the system seems likely to be a great success. For higher temperature metal melting (brasses, &c.) a more conventional tilting crucible gas furnace made by the Morgan Crucible Company is shown.

A re-circulated atmosphere enamelling oven by F. J. Ballard & Co. serves as a reminder of the advances which have been made recently in industrial stove enamelling plant, though this little oven is but a small representative of the very large gas-fired conveyor ovens in which this firm specialize.

The passing of the Factory Act has focussed attention on space heating for factories and large buildings. In addition to representative Potterton and Cochran boilers for central heating, there are medium temperature radiant panels by Bratt Colbran, Ltd., high-temperature radiant panels by Radiant Heating, Ltd., a unit air heater by Keith Blackman, Ltd., and an indirect gas air heater by Perfecta Gas Thermostats, Ltd. Briggs Boilers, Ltd., show a completely automatic gas steam boiler.

An interesting exhibit of burners by Radiant Heating, Ltd., includes Cox combustors and "Duoflam" burners. Precision burners are shown by Amal, Ltd., and by Chance Bros., while the Selas Gas and Engineering Com-

pany, Ltd., display laboratory muffle furnaces, injectors, and other specialities. A. H. Wilkes & Co., Ltd., are showing soldering iron stoves and blow-pipes. Blowers for the supply of air for air blast burners have been provided by Keith Blackman, Ltd., who are also responsible for the compressors supplying gas and air to the glass-blowing burners.

A notable feature of the exhibits is the amount of automatic control gear fitted. Almost all the best known makers of control gear are represented, and many of the exhibits are controlling the furnaces which are working.

Further Exhibits.

On the stands of a number of other firms whose names are well-known in the Industry are to be seen plant and appliances of interest in gas-works practice.

Messrs. Babcock & Wilcox, Ltd., are showing a full-size Babcock Erith-Row flue-type stoker, this being a retort type stoker suitable for application to any flue-type boiler. Piping is represented by a 16-in. corrugated expansion bend, together with a single piece of pipe sectioned to show that its wall is not reduced in thickness during fabrication. Typical examples of joints of various kinds are shown in section and also a representative range of Babcock valves.

Examples of aluminium and its alloys in crude and semi-manufactured forms are to be seen on the stand of the British Aluminium Company, including modern industrial applications. Extruded sections are to be seen of the firm's standard alloys coated with pure aluminium for conditions where the superior mechanical properties of the alloys are required in conjunction with the better corrosion resistance of the pure metal. Aluminium foil for heat insulation will be of interest to the Gas Industry.

The British Thomson-Houston Company, Ltd., are exhibiting supercharging and scavenging blowers for diesel engines, turbo-generators for auxiliary services in addition to geared motor units, variable-speed motors, fractional horse-power motors, photo-electric relays, and other equipment.

The well-known firm of power plant manufacturers, J. Browett Lindley (1931), Ltd., are showing examples of their steam engines and air compressors. As in all Browett Lindley products, the motion work of the plant shown in operation is entirely enclosed, and all bearing surfaces are lubricated under pressure by a rotary gear pump. The pressure is kept constant by an automatic release valve. Cylinder lubrication is arranged independently of the motion work, and an important feature of the design is that when arranged for driving by an electric motor a rigid connection by flange mounting can be made between the motor and the crankcase. By this means it is unnecessary to employ an underbase, thus saving space and expense.

Marine and stationary engines are exhibited by Crossley Brothers, Ltd., and also automatically-controlled generating sets and auxiliary compressors.

Their patent light-gauge tube bending machines, including bench, portable, and standard models, are exhibited by Hilmor, Ltd. A new feature of their XL. model is the patent steel formers which enable two gauges to be bent in one former. There are also to be seen several designs of the firm's drawbar machine, including the hand-operated "Automatic" which is capable of producing 150-250 bends per hour. Expert tube manipulators are in attendance on this stand to demonstrate the operation of these machines, which will be of interest to gas fitters.

Rawlplug fixing devices for every class of fixing work are shown by the Rawlplug Company, Ltd., together with electric and mechanical hammers, boring tools, tile drills, &c.

On the stand of Reavell & Co., Ltd., is a complete range of the firm's standard products, including double-acting two-stage intercooled compressors, single-acting high-speed compressors, rolling-drum rotary compressors, and rotary air engines. There is also an interesting straight-line vacuum pump, together with a high-pressure petrol-driven charging set for supplying air for starting diesel engines. On this stand there is also an example of the Reavell-Askania regulator, the use of which is growing rapidly. As a complete working exhibit of this apparatus there is shown a constant-volume regulator. Air is supplied by a motor-driven fan and is delivered through a 2-in. bore pipe. The air quantity is measured by a small orifice plate, which at full volume sets up a differential pressure of 2 in. w.g., and the regulator operates a control valve arranged at the end of this pipe. The differential pressure set up by the orifice plate, which is, of course, a measure of the volume, is shown on a Cambridge Instrument Company's volume indicating gauge. A hand-operated valve is provided so that the conditions may be altered, and the operation of the regulator, which promptly restores the volume to the set value, is thus demonstrated.

Siebe, Gorman, & Co., Ltd., are showing self-contained oxygen breathing apparatus, oxygen and oxygen *plus* CO_2 resuscitation apparatus, smoke helmet apparatus, gas masks, dust respirators, fire extinguishers, first-aid equipment, protective gloves and goggles, protective clothing, metal spray helmets, welding helmets, and other safety and protective appliances for use on the gas-works, for mainlaying and other operations.

A wide range of tube and fittings and other tubular products is to be seen on the stand of Stewarts & Lloyds, Ltd. From the gas engineer's point of view, owing to the rapid advances made in recent practice, interest will centre round the various types of joints on view, many of which are sectioned to reveal their nature more clearly. Of particular importance are the samples of the Dawson Joint—both with and without flanges. This all-welded joint is recommended for high working pressures and temperatures. There are also samples of joints suitable for gas, water, and sewage mains, including spigot and socket joints and sleeve and spherical welded joints, together with a selection of Victaulic grooved marine joints and fittings, and a wriggling model under air pressure demonstrating the flexibility of the Victaulic joint. Johnson couplings and loose flanged joints are also shown, together with samples of gas, steam, galvanized, and water tubes and fittings, hydraulic tubes, boiler tubes and oil pipes, heating, cooling, and other classes of coils.

Examples of metal-to-metal jointing materials are shown on the stand of Thomas & Bishop, Ltd., for the production of which the firm have lately extended their factory and put down new plant. Also shown are the firm's various ranges of belt treatments, furnace cements for building and repairing all types of furnaces, tinning compounds which clean and tin in one operation, eliminating the necessity for first cleaning, filing, and scraping, "Kester" solder which provides all the advantages of the solder and flux in one, roofing compound, and other materials.

John Thompson (Wolverhampton), Ltd., and Associated Companies are showing examples of their fusion welded drum for water tube boilers, the "Super Economic" boiler with "Triumph" stoker, vertical boilers, domestic water softeners, stainless steel cooking and chemical vessels, &c.

Trier Bros., Ltd., are showing a full range of samples of lubricants manufactured by them, including "Stauffer's lubricant," of which they are the sole manufacturers and proprietors, together with other greases for special purposes. The lubrication of steam plant by use of graphite by the Collgraf system is also demonstrated, together with all grades of "Sealite" plastic metal packing.

Foundry Trades and Welding Exhibits.

Running concurrently with the Engineering and Marine Exhibition are sections devoted to the Foundry Trades and Welding practice.

Here the Coleman Foundry Equipment Company, Ltd., are showing core machines which are claimed to be the only horizontal core machines on the market. This firm are also exhibiting moulding machines, metal cut-off machines, core and mixers, sand sifting machines, a coke-fired furnace which is claimed to melt 200 lb. of metal in 35 minutes with 25 lb. of coke, and also vibrators, blow guns, and various pneumatic tools—all in operation.

In the section devoted to metal spraying on the British Oxygen Company's stand a complete metal spraying plant is in use. This consists of the pistol (special nozzles of the rotary extension, and deflector types are exhibited near at hand), cylinders of oxygen and hydrogen, tubing, regulators, and an Ingersoll Rand Type No. 30 air compressor. A small lathe is employed to demonstrate the building-up of worn parts by the use of the pistol. These demonstrations include the deposition of high and low carbon steels as required in the rebuilding of such parts as crankshafts, stub axle pins, ball race journals, and housings. The application of zinc by the pistol for protection against corrosion and of aluminium for heat protection is also demonstrated.

Further examples of metal-to-metal jointing compounds are exhibited by Clough (Croydon), Ltd., together with tinning compounds, belt preservatives in liquid paste and bar form, lubricant for wire ropes, gears, springs, &c., asbestos fire cement, anti-pluvious plant, and refractory cements.

On the stand of Hancock & Co. (Engineers), Ltd., is an interesting oxygen cutting machine, with twin annular cutting head, together with a triple-head machine, a direct cutting and profiling machine, and a portable automatic straight line and circle cutter capable of cutting circles from 4½ in. radius upwards without limit, with the entire machine supported within the circle.

THE NEW PRESIDENT,
J. Stephenson, of Aberdare.

Wales and Monmouthshire Association

Discuss the Coal Burden

Record attendances all round were marked in connection with the Autumn Meeting of the Wales and Monmouthshire Association of Gas Engineers and Managers, which took place on Wednesday and Thursday of last week at Porthcawl. No better place could be found within the area of the Association for a September meeting, and it is not surprising, therefore, that the gatherings there gain in popularity with the passing of the years.

Once again the business was transacted in the Grand Pavilion, on the Esplanade, and the proceedings were punctuated by some caustic criticisms of the coal situation, as viewed by purchasers in the Gas Industry, requiring large quantities and special qualities.

Mr. H. D. MADDEN (Cardiff) the outgoing President, occupied the chair at the commencement of the business, and extended a hearty welcome to the visitors and members. Among the former, he made special reference to Mr. W. Ross Taylor, M.P. (of the National Gas Council), Mr. A. L. Morris (Cheltenham and Severn Valley Gas Corporation), Mr. P. S. Hoyte (late of Plymouth), an old friend who had been with them on several previous occasions, and Mr. Frank West (Buxton), who was present with his colleague, Mr. G. T. Clark. Another gentleman he had particular pleasure in welcoming was Mr. F. J. Edmonds, of Waterford, a new member; while Mr. W. R. Branson, a member of his own staff, who was to read a Paper later on in the meeting, was also a new member.

Additions to Membership.

Mr. OCTAVIUS THOMAS (Hon. Secretary and Treasurer) having read the minutes of the last meeting, which were confirmed, the following additions were made to the membership of the Association:

Ordinary Members.

W. F. Edwards (Manager, Bridgend Gas Company).
E. F. Hughes (Manager, Llandovery Gas-Works).
F. S. Johns (General Assistant, Swansea Gas Company).

Associate.

W. Harriss (Manager, Burt, Boulton, and Haywood).

The New President.

Mr. MADDEN said his next duty was the very pleasant one of introducing the President-Elect, Mr. J. Stephenson, of Aberdare. To many of those present he needed no introduction, for they knew that at Aberdare, with a difficult position to face, he had done most excellent work. Before that, Mr. Stephenson was at Ferndale, where he was called upon to exercise just the qualities which he possessed. Not only had he done much for gas, but at Aberdare he held various other offices, in connection with which he rendered services to the town that were greatly appreciated. There was no doubt whatever that he would make a most successful President.

Mr. STEPHENSON, who received a cordial greeting at the hands of his fellow members, expressed his gratitude to Mr. Madden for the kind remarks he had made, and then thanked him, on behalf of the members, for the able manner in which he had presided over the affairs of the Association during the last twelve months. The year had, Mr. Stephenson said, been a memorable one, and they were all pleased that Mr. Octavius Thomas had thought of suggesting that the centenary of the Cardiff Gas Company should be marked by the election of Mr. Madden as President for the third time. They remembered his Presidential Address, which reviewed the progress of the Gas Industry during its long career, and they also remembered the very enjoyable luncheon to which they had been invited through the courtesy of the Directors of the Company and Mr. Madden, and the subsequent visit to Grangetown. A visit to Grangetown was always of value, because there was invariably something new to see, and the spirit of co-operation with which they were brought in contact there was an inspiration. This spirit and the keenness that the staff showed in their work were a reflection of Mr. Madden's own methods.

He asked Mr. Madden to accept a salver, suitably inscribed, as a memento of his year of office.

Mr. MADDEN, returning thanks, said that both he and Mrs. Madden would treasure the Association's gift as a reminder of the 31 years during which he had been a member of the Association, and of the signal honour which the members had bestowed upon him on three occasions by making him their President, and particularly in the centenary year of his Company. His Chairman and Directors appreciated the kind action of Mr. Stephenson in standing aside for one year to enable this to be done. What he would like to see now would be some of the younger members coming forward and taking office, seeing that the future rested in their hands.

Presentation of Prizes to the Juniors.

Mr. ROSS TAYLOR, at the invitation of the President, then presented prizes to members of the Wales and Monmouthshire Junior Gas Association for work done and for passing examinations. He said he counted himself exceedingly fortunate in representing the National Gas Council once again at Porthcawl, because it was very nice indeed to come into so friendly an atmosphere. He appreciated highly the privilege of presenting these prizes, because he felt strongly that the Association were setting an excellent example in encouraging those young people who were destined eventually to take up responsible positions in the Gas Industry. He did not know of any district in which this idea was carried out with the thoroughness that characterized their policy in South Wales. He congratulated the winners, who might consider themselves lucky in having embarked in an Industry which, in spite of its long life, was as young and as active as ever to-day. With the educational facilities, both theoretical and practical, that were now available, and with suitable encouragement, the traditions of the past would be worthily maintained.

The PRESIDENT pointed out that, not only were the prizes an encouragement to the students as students, but they

should be an incentive to young men to join the Junior Association.

For work done for Wales and Monmouthshire Junior Gas Association.

J. H. Chapman . . . . . Swansea
A. H. Dyer. . . . . Newport
D. W. Rees . . . . . Neath
H. V. Williams . . . . . Cardiff

For passing Examinations of Institution of Gas Engineers.

Higher Grade Gas Engineering, 2nd Class (Internal).

N. H. Greenway . . . . . Cardiff
F. S. Johns . . . . . Swansea

Ordinary Grade Gas Engineering, 1st Class (Internal).

P. H. G. Spray . . . . . Cardiff

Ordinary Grade Gas Engineering, 2nd Class (Internal).

Kenneth M. Ernest . . . . Cardiff

Ordinary Grade Gas Supply, 2nd Class (Internal).

D. H. Heycock . . . . . Port Talbot
K. E. Muir. . . . . Cardiff
D. E. West . . . . . Port Talbot

For passing City and Guilds (London) Examinations.

Gas Fitting, Grade 1.

T. J. Price. . . . . Newport
T. G. Sykes . . . . . ,,

Gas Fitting, Grade 2.

K. L. Pinnell . . . . . Newport

Gas Fitting, Final Examination.

H. Brown . . . . . Chepstow

For passing Cardiff Technical College Internal Examinations.

Gas Engineering, Stage 1.

G. Osborne . . . . . Cardiff

Gas Fitting, Stage 1.

G. Taylor . . . . . Barry
J. Carpenter . . . . . Cardiff
J. H. Willis . . . . . ,,

Gas Fitting, Stage 2.

J. Loyns . . . . . Barry
E. D. Higgins. . . . . Cardiff

Gas Fitting, Stage 3.

T. Cavanagh . . . . . Cardiff
Wm. S. Llewellyn . . . . ,,
R. J. Perry . . . . . ,,

Gas Fitting, Stage 4.

A. T. Ellett . . . . . Barry
D. K. Rees. . . . . ,,

Special Purposes Section.

The 27th annual report of the Special Purposes Section stated that five meetings had been held during the year. The membership consisted of 10 local authorities and 26 companies. The Committee decided to take part as in previous years in the Industries Fair held in the Greyfriars Hall, Cardiff, last April, under the auspices of the National Industrial Development Council of Wales and Monmouthshire. A comprehensive Joint Gas Exhibit was arranged which proved to be of considerable propaganda value. The receipts for the year amounted to £46 2s. 4d., and the payments to £42 15s. 6d., leaving, with the balance brought forward, the sum of £71 13s. 8d. in the hands of the Treasurer, together with £300 of 2½% Consols.

Mr. W. CLARK JACKSON (Neath), moving the adoption of the report and accounts of the Section, which were signed by Mr. H. D. Madden, as Chairman, remarked that during the year careful attention had been given to the various phases of the commercial side of the Industry. It was gratifying to note that the coke position had improved, as this was some little offset against the increase in the price of coal which had to be met this year. It was rather peculiar that in South Wales the increase in the cost of coal was at a higher percentage over the previous summer price than in any other district in the country. This ought to be brought home to the coal people, with a view to South Wales being put on a level with other districts at least. He trusted that every gas undertaking in the area would eventually join the Section.

Mr. J. H. JONES (Dowlais) seconded the resolution, which was adopted without discussion.

Evaluation of Coal for Gas Manufacture.

Mr. W. R. BRANSON, M.Sc., Assoc.M.Inst.C.E., of the Cardiff Gas Light and Coke Company, then read a Paper entitled "The Evaluation of Coal for Gas Manufacture," which will be found in another part of the "JOURNAL." The Author mentioned that, since writing it, he had come across a Presidential Address to the Waverley Association in 1929, in which Mr. James Jamieson, of Edinburgh, explained the methods adopted at that city, in which there were similarities with the process to which his own Paper drew attention.

The Paper gave rise to a lengthy discussion, in which there were some frank and fearless remarks on the coal situation as it affects the Gas Industry of South Wales to-day. The local Press gave wide publicity to these remarks, which one must hope may be productive of good. In order that they may have due prominence in this report, they have been separated from other points in the discussion.

Exorbitant Coal Prices.

Mr. J. H. CANNING (Newport) said that to-day they were paying the most exorbitant prices in that district for coal, and so it became more necessary than ever for them to see that they got the fullest possible value for this unjustifiable charge. If they could discover some method of getting rid of the coalowner altogether in the near future, they would be in a happier position. If they did not watch the ash content of their coal, advantage was very soon taken of this fact by certain people—he did not say all—who supplied coal. There were types of washed coal which had a wonderful power of absorbing and holding water, and it was exceedingly important that they should not be paying the exorbitant prices to which he had referred for perhaps 1 cwt. of water in every ton of coal.

Mr. CLARK JACKSON said he felt that a Paper like this should be read before their coalowner friends, though he did not think they would get the coalowners to appreciate as they themselves appreciated the values of different kinds of coals. The Gas Industry was bound by law to maintain certain standards, while the coalowners were under no such obligation.

Enlightenment Needed in London.

Mr. W. H. JOHNS (Swansea) said he agreed with the desirability of educating the coalowners, if it was possible to do so, with regard to the real value of the coals which they were offering to the Gas Industry to-day. It behoved every one of them to keep a close eye on the coal sent in to their works. At the same time, with the Coal Selling Board they had to deal with to-day, it had to be admitted that they were not free agents in the procuring of their coal. They had to take the coal which the Board had for sale into their works, whether they liked it or not. The gas coal of South Wales was not to be compared with the coals used for similar purposes which were obtainable in other parts of the country. Unfortunately, owing to the operations of the Coal Selling Board, they were barred to-day from going to other districts and getting coals which they might feel would be of greater value to their undertakings than the coals which they were obliged to work with now. If the Paper did nothing more than draw attention to the difficulties under which they were labouring in this connection, it would have done good. He suggested that the matter should be laid before the Secretary for Mines, so that the people in London might be enlightened with regard to the difficulties under which some of them were working. They could not get the coal they ought to get, and so they were unable to obtain the results they would like. They must emphasize as much as they possibly could the fact that they were not as free to-day as they would like to be, and that they were getting coal which they thought might be much better in value, and much cheaper in price.

A Very Serious Situation.

Mr. ROSS TAYLOR remarked that the subject before them that day was one which brought into great prominence the very serious situation which faced all coal users at the present time, and particularly the Gas Industry. It was a situation which necessarily created a great deal of apprehension in the minds of many people, and it was very difficult to see what was the remedy. The country had been put at the mercy of the coalowners. The 1930 Act was designed to improve the conditions of the coal-mining industry and to better the lot of the miner. He thought that this purpose had been to a very great extent achieved. The coalowners were in a much better position than before, and the miners were also better off. That was all to the good. But, on the other hand, the measures taken to bring about that result had taken no account of the interests of the consumer.

No adequate safeguards had been given to the consumers. Under the coal selling scheme the only recourse was to Committees of Investigation, which had proved absolutely futile. The Committees had no power to do anything but make recommendations. This certainly was a matter that ought to be set right. Legislation along these lines had been promised, but he was not at all sure that it would be sufficient. Then Consultative Committees had been set up, but he understood that in South Wales they also had proved futile. The Government should be asked to give consumers some adequate safeguard against the absolute powers which

were in the hands of the coalowners. Consumers should be able to get at a reasonable price the kind of coals they wanted, but at the present time they were not able to do so. The Gas Industry would have to endeavour to mobilize public opinion. It would not be easy, but if could be done, and when it had been done he thought Parliament would move in the matter, and the consumer in the end would get a fair deal.

The PRESIDENT said they knew that collieries were working now which were not working before, and they were very pleased to have this knowledge. He very much doubted, however, whether this was the result of the Coal Mines Act of 1930. He thought it was due more to the general improvement in trade, fostered to a great extent by the rearmament programme.

An Alteration to the Rules.

It having been agreed that the place of next meeting should be left to the Committee to determine,

Mr. J. H. CANNING, moving that Rule 3 be altered to read as follows, said that he was not the originator of the proposal, which was entirely due to Mr. Madden, who was President at the time. It was absolutely essential that whoever represented the Association on the Council of The Institution of Gas Engineers should be in the closest possible touch with the Committee of the Association—in other words, that he should be a member of the Committee. They had made a practice of appointing the President for the time being as their representative on the Institution Council, but it was impossible for a man in one short year to become acquainted with all that was going on in the Council of the Institution. Therefore they decided to make it a three years' appointment, and they selected as their first representative under these new conditions Mr. Octavius Thomas, to whom they were under a debt of gratitude for the able and conscientious manner in which he had carried out the duties of this office. Now they had asked Mr. W. H. Johns to become their representative, but unfortunately Mr. Johns was not a member of the Committee of the Association. Hence the proposition.

The PRESIDENT seconded the motion, and it was unanimously agreed that:

> The management of the affairs of the Association shall be confided to a Committee which shall consist of a President, two Vice-Presidents, Honorary Treasurer, Honorary Secretary, six members, and (if he be not already a member of the Committee) the representative of the Association for the time being on the Council of The Institution of Gas Engineers, three to form a quorum. Past Presidents for the preceding three years to be *ex-officio* members of the Committee.

Luncheon.

Members and guests then adjourned to luncheon at the Esplanade Hotel, following which Mr. Ross Taylor submitted the toast of "Prosperity to Porthcawl." The response was by Mr. R. B. Thomas, Chairman of the Porthcawl Urban District Council Gas Committee, who said he had endeavoured, with the help of all the members, to put the gas undertaking in a position to compete successfully with electricity, and he hoped that by the end of his twelve months of office they would have gone far in this direction. He mentioned that they had spent £25,000 upon the undertaking to place it on modern lines.

Mr. Madden presented to Mr. D. W. Rees, of Neath, the two Cups and replicas which he had won in the golf competitions on the previous day—remarking that this was the first occasion in the history of the competitions on which one member had won both Cups on the same day.

Proposing the toast of "The Association," Mr. Frank West said it was doing excellent work. The fraternal spirit so much in evidence, and the encouragement given to the Juniors, were factors that must have an important influence upon the progress of the Industry. On behalf of himself and the other visitors, he wished the Association every success, and the President a very happy year of office. Responding, the President said the members did feel that the Association was doing good work, and its usefulness was largely owing to the unceasing efforts of their old friend and Secretary, Mr. Octavius Thomas. It was surprising to find how ignorant were the general public on the subject of the position and future of gas. The field for the utilization of gas in industrial processes was ever widening, and a tremendous number of gas refrigerators were being sold, but in spite of all this people seemed to know very little. There were still vast opportunities for the use of gas for lighting, both domestic and for street illumination, but, again, they must make it known. It was essential that they should, individually and collectively, endeavour to impart to the public at large the information on these matters which they themselves possessed.

On the proposition of Mr. G. T. Clark, hearty thanks were accorded Mr. Wilfrid Jones and Mr. Joe Sadler for the invaluable help they had given in the arrangements for so successful a meeting.

Golf Competitions.

On the day preceding the business meeting, and under far less favourable weather conditions, the customary golf competitions of the Association took place, once again on the delightful links of the Royal Porthcawl Golf Club, and also once again under Mr. Joe Sadler's efficient organization. It will be noted that Mr. D. W. Rees, Assistant Engineer at the Neath Gas-Works, succeeded in carrying off both the Cups.

Upjohn Cup.

The morning competition for this Cup was by medal play, and the scores were as follows. Mr. Rees won on the last nine holes.

	G.	H.	N.
D. W. Rees	85	6	79
R. R. Bird	86	7	79
W. Clark Jackson	83	2	81
F. D. Drake	92	10	82
A. L. Morris	94	11	83
F. J. Edmonds	103	18	85

Wilfred Dean Cup.

In the afternoon there were bogey singles, with the following result:

D. W. Rees	all square
F. D. Drake	4 down
A. W. Goode	5 ,,
C. A. King	6 ,,
F. Boardman	6 ,,
H. H. Wightman	6 ,,

The "largest ever" golf dinner took place in the evening at the Esplanade Hotel, when nearly sixty sat down, with Mr. H. D. Madden in the chair, in the regretted, but unavoidable, absence of Mr. R. J. Auckland. Mr. Madden remarked that they had had a very successful day, in spite of the fact that the weather had not been all that they could have wished. He extended congratulations to the winner of the Cups, and to the runners-up—Mr. R. R. Bird and Mr. F. D. Drake. They could not, he said, have carried through the competitions without the kind assistance of the Royal Porthcawl Golf Club, and the help of the Captain, Mr. E. E. Davies, O.B.E., the Secretary, Mr. Hubert Redford, Mr. Hutchinson, the professional, and the staff. To one and all they owed grateful thanks. For many years it had been the good fortune of the Association to play on this magnificent links, and there was no District Association in Great Britain and Ireland who had a better golf day than they did at Porthcawl. He welcomed by name a number of visitors, and announced the presence of a new member of the Association and of the Industrial Development Centre—Mr. F. J. Edmonds, of Waterford.

The Captain of the Golf Club presented the prizes to the runners-up, and Mr. Redford was afterwards called upon for a few remarks.

Mr. A. L. Morris, of Cheltenham, who received a hearty welcome at the hands of the Chairman, said this was his first visit to Porthcawl and to the Golf Club, and he had been deeply impressed by the cordiality of his reception.

Ten Years' Street Lighting Contract

Cannock Contract Term Extended

Although the public lighting of the Cheslyn Hay Parish has always been carried out by gas supplied by the Cannock District Gas Company, the previous contracts had been concluded from year to year. We now learn from Mr. Charles R. Ingham, Engineer, Manager, and Secretary of the Cannock District Gas Company, that the term of the contract recently concluded with the Cheslyn Hay Parish Council is for ten years.

It is very satisfactory to note that opportunity is being taken of this renewed agreement to carry out several improvements in the lighting installation.

WALES AND MONMOUTHSHIRE ASSOCIATION

The Evaluation of Coal for Gas Manufacture

by
W. R. BRANSON
(of the Cardiff Gas Light and Coke Company)

A Paper presented at the General Meeting of the Association held at Porthcawl on Sept. 16 under the Presidency of Mr. J. STEPHENSON, of Aberdare.

While no originality is claimed for the material presented in this Paper, it is hoped that a brief survey of the methods available for the assessment of the gasmaking value of coal may be of interest to members.

The latest figures available in the Board of Trade Return[1] for 1935 show that, in the period between 1929 and 1935, the yield of gas per ton of coal carbonized by authorized undertakings increased from 14,245 cu.ft. to 15,063 cu.ft., or by 5·7%. The annual figures for the intervening period show the improvement to have been fairly steady at the rate of about 1% per annum. This increase may be partly due to an increased use of steaming in vertical retorts in place of water gas made in separate generators, since it was accompanied by a fall of some 300,000 tons in the quantity of coke, and 7,400,000 galls. of oil used for making water gas. The oil used per 1,000 cu.ft. of C.W.G. rose slightly from 1·25 to 1·29 galls., though the percentage of water gas made fell from 15·4 to 10·9. Hence one may assume the calorific value of the coal gas to have fallen slightly. There may also, due to an increase in the application of dry cleaning, have been some slight improvement in coal quality. Nevertheless, it seems reasonable to suppose that carbonizing efficiency continues to increase throughout the Industry as a whole.

The cost of coal, however, remains the largest single item in the revenue account, and even after deducting revenue from residual products Fields' Analysis[2] for 1936 shows that the net cost of coal to the 40 undertakings concerned amounted to 1·30d. per therm in the case of company owned undertakings, and 1·47d. per therm in the case of local authorities. Further, as is indicated below, the quality of the coal purchased will have affected, to a greater or less extent, almost every other item comprising a statement of working costs.

The present upward trend of coal prices can, therefore, only serve to emphasize the need for effort to improve still further the value obtained from coal purchased.

The choice of coal is in many instances limited by the geographical position of the works, and the operation of the Coal Mines Act may have restricted choice still further. It is possible, however, that greater attention to the selection of the coals most suitable for the carbonizing plant available might be well repaid.

The assay of coal may be carried out for either of two purposes—viz., the selection of coal or the routine examination of contract deliveries to ensure that the specified quality is being maintained.

In the latter case, provided sampling and testing are carried out with due care, almost any of the numerous laboratory and semi-scale methods may be made to yield satisfactory results. In the former case, no small scale method alone can give with accuracy an estimate of the cash value of a particular coal. Yet contracts to the value of many thousands of pounds may depend on the results, and for this reason attention in this Paper has been directed principally to this problem. Before considering the various methods available, it may be as well to summarize briefly the factors affecting working costs from the point of view of the effect of coal quality upon each.

A most valuable Paper presented by Mr. F. B. Richards, of the Woodall-Duckham Companies, to the Eastern Counties Association in 1934,[3] entitled "Perspective in Carbonizing Costs," shows very clearly the method of stating comparative costs. In the appendix to Mr. Richards' Paper a table shows typical comparative figures for continuous and intermittent vertical retorts carbonizing Yorkshire screened and Durham run-of-mine coals. This table will be found a very useful guide to anyone preparing similar statements such as are necessary in the comparative evaluation of coals.

Tabulating the Items.

The items comprising the total cost may be tabulated as below:

1. *Coal cost per therm.*

   This will obviously depend only on the gaseous thermal yield and the cost per ton. The thermal yield should include, in the case of vertical retorts, the water gas produced by steaming to such an extent as to give a mixed gas of the desired calorific value.

2. *Labour Cost.*

   This figure will depend principally upon the size, type, and lay-out of the carbonizing plant and its auxiliary machinery, but may be affected appreciably by the coal employed. In a given installation the wages will depend upon the number of retorts which it is necessary to keep at work, and this will vary with the thermal yield per ton and the throughput obtainable per retort. Thus it is well known that, in the case of continuous vertical retorts, the elimination of fines from the coal used results in a substantially greater throughput per retort. Differences in moisture content and in the resistance of the plastic layer to heat penetration will also influence carbonizing rate.

3. *Fuel Cost.*

   This is largely a function of the type, design, and condition of the retort installation, but the factors referred to above under Labour Costs will have a similar influence on this item.

4. *Capital Cost.*

   This, in most cases, must be regarded as a fixed charge unless new plant is being installed. It is possible that cases may arise where a change in the coal used to one giving a higher thermal output per retort will enable extension of carbonizing plant to be delayed or avoided. When new plant is being considered, the factors referred to under 2 and 3 above will have a similar influence on capital cost. Incidentally, it may be mentioned that while some attention has been paid by the Gas Industry, notably at Liverpool, to mixing of coals to produce a coke for use in the open fire, little has been directed to the effect of blending on the rate at which carbonization may be carried out; although in the coke oven industry the work of Mr. J. Roberts, Dr. Koppers, and others on this subject is well known. Strongly coking coals which alone are slow in carbonizing may be coked much more rapidly when intimately blended with weakly coking or non-coking coals, or with coke breeze, while the coke produced is more readily combustible. The possibilities in this direction might be worth further exploration by the Gas Industry in view of the possible effect on labour, fuel, and capital costs.

5. *Revenue from Residuals.*

   (*a*) *Coke and Breeze.* Provided the coke is not unduly high in ash and is properly quenched and graded, the price realizable will depend much more upon market conditions than upon differences in such qualities as ignitability and reactivity. It must be borne in mind, however, that a reactive coke suitable for

[1] "GAS JOURNAL," Nov. 25, 1936, p. 593.
[2] "GAS JOURNAL," July 28, 1937, p. 240.
[3] "GAS JOURNAL," Oct. 31, 1934, p. 339.

use in the open grate has the advantage of selling in a market less liable to extreme fluctuations in price than the industrial and export trade. The proportion of breeze produced in handling, cutting, grading, &c., may, however, be extremely important; thus a difference of ¼ cwt. per ton in the breeze made from two coals yielding equal total quantities of coke and breeze will have about the same influence on costs as a difference of one therm per ton in the gas yield. Where a large proportion of the coke sold is in the form of nuts and broken coke, the extent to which breeze is produced may have an important bearing on the selection of coal.

(*b*) *Tar, benzole, &c.* The tar yield may vary considerably with different coals, a difference of one gallon in the yield making a difference of about 0·04d. per therm in the cost of gas.

Other residuals are unlikely to differ in quantity to such an extent as to affect the choice of coal, and benzole and ammonia have not been considered further for this reason.

Wear and tear has been omitted from the above tabulation, as it is unlikely to be greatly affected by the coal selected, and also because it is almost impossible of assessment during the period of a test. Generally speaking, higher throughputs will reduce wear and tear costs per therm, while such factors as a high or fusible ash or extreme swelling (in the case of vertical retorts) will tend to increase it.

Assay Methods.

For many years the proximate analysis was almost the only laboratory test regularly carried out on coal. It still retains its usefulness as a means of ascertaining the inert content of contract deliveries, but as a guide to gas and coke making properties it is only very approximate.

Among the more recently evolved methods in which an attempt is made at more accurate estimation of practical gas yields and coke quality, the Lessing and the modified Gray-King methods are probably best known in this country. The latter is fully described in Fuel Research Technical Paper No. 24, and both are too well known to need detailed description here. In both cases the quantity of coal used is small and needs to be finely ground. As a consequence, the tar yield is too small for further examination, while an important practical factor—namely, the grading of the coal, is obviously eliminated by grinding.

A further method which has been popular in the Gas Industry for many years is the use of a 1/1,000 ton experimental plant. Such a plant is described by King in his "Treatise on Coal Gas" as long ago as 1878, and while the temperature control and the methods available for examination of the products have been vastly improved, the procedure remains essentially the same today. The technique of its use is described by Weyman in "Modern Gasworks Chemistry," and with slight modifications this is widely used and under certain conditions yields results which are capable of approximating to full scale results. The temperature used naturally has an important influence on the gas yield, and from experiments carried out at Beckton and reported by S. Hay in a Paper before the Southern Association,[4] it appears that in the neighbourhood of 1,000° C. the thermal yield from average Durham coals is increased by 6 therms per 100° C. temperature rise. The difference in temperature between the experimental plant and the full scale retort may, therefore, be corrected for with a fair degree of accuracy.

Many of the larger works are equipped with experimental plants carbonizing charges up to 1 or 2 cwt., and these obviously approach more nearly still to actual working results, provided conditions of testing are carefully standardized and maintained. Factors such as temperature variation and leakage of gases either into or out of the retort are more likely to lead to erroneous results in these last two methods, unless heating is under accurate control, and the retorts are of metal construction, this having the disadvantage of high cost where working temperatures exceed about 1,000° C.

Experimental Plant at Cardiff.

The experimental plant at Cardiff comprises a setting of two horizontal fireclay retorts in a direct fired setting, complete with ancillary purification plant. The charges are 1 cwt. each, and two charges are carbonized simultaneously in each test. Every test is repeated and, should any large discrepancy in the gas yield appear, a third is carried out.

Valuable results have been obtained in this plant, which has the advantage of a coke yield large enough to be graded, so that a fair idea of the amount of breeze likely to be produced on a full scale may be obtained. The appearance of the coke may also be a useful indication of the extent to which shale or dirty appearance may cause complaints from domestic coke users.

A still nearer approach to full scale results may be obtained by providing one retort setting of a bench with separate gas and tar offtakes connected to suitable purification plant, tar tanks, &c. In this way, it is possible to obtain results of very great value, but the cost of the installation and its operation will be considerable.

A study of the Papers of the Fuel Research Board makes it clear that those responsible for the evolution of the Gray-King apparatus would be the last to contend that such methods, or even those on a larger scale, can alone yield any close estimate of the value of a coal. Indeed, it is clear that they regard it as essential for the laboratory results to be correlated with the results of full scale tests so as to obtain correction factors which may then be applied to the results of further assays to give an estimate of the probable working yields.

Unfortunately, few gas-works are in a position to carry out a full scale test without considerable trouble. Possibly the smaller works are in one respect in the most fortunate position in that the sources of coal supply are usually less numerous than those of the larger works, while a consignment of, say, 50-100 tons may be adequate for a test. On the other hand, these works are not always able to spare the personnel to supervise the carrying out of the work. In most cases, however, results of value could be obtained even if some details were omitted.

Large undertakings or holding companies controlling a number of works in the same area may be able to allocate the job to the smallest works and to provide the necessary staff.

For other undertakings with only one works, and possibly only a single carbonizing plant, the arrangements for a complete test may be a matter of some difficulty, but it is suggested that the results are of such value as to make the effort and expense worth while. It should be remembered that once a small number of coals have been tested in this way and the results compared with laboratory or small scale tests, the behaviour of further coals can be forecast with fair accuracy from the assay results alone.

The procedure necessary for a complete test may be gathered from the numerous reports of The Institution of Gas Engineers and the Fuel Research Board. It is not suggested that the medium-sized works need carry out tests in such detail as these bodies, but their methods will serve as a useful guide to the essentials.

The ultimate object of any test of this sort is to arrive at a valuation of the coal in terms of £ s. d., and the measurements necessary must be made with this in mind. At the same time, reasonable accuracy is necessary if results are to be of value, and a weight balance will serve as a useful check on the measurements made.

The necessary measurements may, therefore, be reduced to the weight of coal and steam (if any) charged to the retorts and the yields of gas, coke, breeze, tar, and liquor. Records of the fuel used, temperatures employed, and conditions of vacuum or pressure in retorts should also be kept. If horizontal retorts are used and the fuel cannot be measured, then the net coke and breeze made for sale will be measured, and the fuel charge will disappear from the cost statement. The coke and breeze should be sampled and the moisture estimated, all test results being corrected to a standard figure of, say, 5% on the coke and 15% on the breeze. If possible, the coke should be handled in the normal manner—*i.e.*, screened, cut, &c., and the proportion of breeze made determined. If this is not possible, a definite quantity should be so treated and the results calculated back.

If results are to be of value, stable conditions must be attained prior to the commencement of the test proper, and for this purpose it may be necessary to run for two or three days while carbonizing conditions are adjusted to give optimum results.

In setting out the results it is suggested that one of the coals tested should be regarded as a standard of comparison, and that the value of other coals should be assessed in relation to the price of this standard coal. Alternatively, a hypothetical standard coal may be adopted. The credit taken for the residuals should be based on the net revenue from the products—*i.e.*, the *selling* price *less* handling costs, wear and tear of coke plant, &c.

To make this clearer, the following example has been worked out. "A" and "B" are two coals on which tests are presumed to have been carried out, the price of "A" being 22s. 6d. per ton. It is desired to know the value of coal "B" in relation to "A." The prices taken

[4] "GAS JOURNAL," Nov. 23, 1927, p. 538.

have been chosen for simplicity and may bear little relation to those at present ruling:

—	"A."	"B."
Coal carbonized during test (tons)	100	110
Carbonizing wages	£10	£10
Gas yield (therms per ton)	75	72
Fuel used—		
Coke (cwt. per ton coal)	2·4	2·25
Breeze (cwt. per ton coal)	0·6	0·6
Coke made (cwt. per ton)	12·0	11·5
Breeze made (cwt. per ton)	3·0	3·0
Tar made (galls. per ton)	10·0	11·0

COAL "A."

	s.	d.	s.	d.
Costs—				
Coal per ton			22	6
Carbonizing wages per ton			2	0
Fuel cost per ton			3	1·8
			27	7·8
Less revenue from residuals—				
Coke at 25s. per ton	15	0		
Breeze at 5s. per ton	0	9		
Tar at 3d. per gall.	2	6		
			18	3
Net carbonizing cost per ton			9	4·8

= Cost per therm 1·50d.

COAL "B."

For equal costs per therm—*i.e.*, 1·50d.—net carbonizing cost per ton must be 72 × 1·5 = 9s.

	s.	d.	s.	d.
Net carbonizing cost per ton			9	0
Plus revenue from residuals—				
Coke at 25s. per ton			14	4·5
Breeze at 5s. per ton			0	9
Tar at 3d. per gall.			2	9
	s.	d.	26	10·5
Less fuel costs	2	11·5		
,, carbonizing wages	1	9·8		
			4	9·3
Valuation of coal			22	1·2

Briefly summing up the foregoing, I have endeavoured to show the limitations of assay methods and put forward a plea for more full scale testing of coals, and what is equally important, for expressing the results of tests in terms of cash value. Failure to translate the laboratory report into commercial terms is to waste much of the efforts of the chemist and research worker.

In conclusion, I should like to express my thanks to my Chief, Mr. H. D. Madden, for his encouragement and advice in preparing these brief notes.

Discussion.

The PRESIDENT (Mr. J. Stephenson, of Aberdare), thanking the Author for his Paper, said his own experience was that at the present time it was very desirable for proximate analysis of coal to be made fairly frequently, in order to control as far as possible the deliveries. So far as evaluation for gas making purposes was concerned, the closer the test approximated to full scale working, the greater would be its value in assessing the cash value of the coal. It had always been a matter of some surprise to him to see that one works would carbonize a certain coal successfully, whereas at another works, apparently under similar circumstances, the same coal gave very different results. In assessing the cash value of a coal, therefore, consideration must be given to the question of how far the coal might suit a particular plant. He wondered whether the test plant at Cardiff, with a direct-fired setting, gave an exact idea of how the coal would work through a large-scale horizontal plant.

Coal Blending.

Mr. H. D. MADDEN remarked that, as it came within his year of office; he had been responsible for finding a Paper for the meeting, and the happy idea had occurred to him of asking Mr. Branson if he would prepare one on these lines. Mr. Branson had had a great deal of experience on fuels, on which subject he obtained his M.Sc. He (Mr. Madden) would say to the younger members: "You cannot hurry research work; you must not jump to conclusions." It was necessary to take time. Working slowly, they were almost sure to be accurate in their results. Mr. Branson had pointed out the importance of converting laboratory tests into commercial values. The work of the chemist must be translated for the manager to know what the commercial results would be when purchasing coal. For many years past they had been blending coals at Grangetown. They started this practice because they had coals in their district which swelled very much, and others which were poorly coking. Blending the two was therefore considered advisable, and they had had a lot of experience in obtaining results in this way. More especially was this practice necessary when working with continuous vertical retorts, in order that the throughput per retort might be maintained, and also the yield of gas per ton of coal. Coal was costing more to-day, and therefore it was more than ever necessary to make every effort to extract the utmost possible value from every ton they carbonized, in order that they might keep their gas at the lowest practicable figure.

Mr. W. M. FOX (London) felt that a point which had been overlooked in favour of blending was the enhancement of the quality of the coke, and the increase in its marketable value. Experimental plants were definitely of value, but he thought that full-scale tests arrived at by isolating one unit of the plant were of greater use. The Author suggested that isolating one unit in this way was expensive, but, on the other hand, putting in an experimental plant and staffing it cost a good deal of money. By isolating a unit, they were able to test under ordinary gas-works procedure. All that would be required was a few careful readings of the separate stream in the same way as the ordinary stream.

Small Scale Experimental Tests.

Mr. J. H. CANNING (Newport) said the Paper must prove useful to everybody who wished to evaluate coal for gas manufacture. He would like to support the President in what he had said as to the value of proximate analysis of coal, particularly in the smaller works. Proximate tests could be easily made, even by the smallest undertaking. He did not, however, suggest that they should take the place of more elaborate tests where these were practicable. With regard to small scale experimental tests, at Newport for many years they had used a plant capable of carbonizing 1 lb. of coal, and he did not know that there was any advantage in increasing the amount to 1/1,000th of a ton. A plant such as that to which he referred could be put up very cheaply, and it went into a small space. As to evaluating one's coal on the basis of these small scale tests, he might say that at Newport the practice was to select a certain standard coal. It should be a coal of which one had had a lengthened experience on a large scale. It must also be a coal which did not contain a high percentage of pyrites or sulphur in any other form, or be liable to deterioration when stocked. If one could obtain such a coal, and set aside (say) a ton of it carefully selected, and kept in a dry, cool place, then, when the unknown coal was being tested, charges of the standard coal could be sandwiched in between charges of the coal that was being tested. It was found at Newport that this furnished a very good indication of what the new coal was going to give them on a large scale. Of course, nothing whatever could fully take the place of a large scale test, and he had always endeavoured at Newport, after evaluating a coal and testing it on a small scale to get sufficient to make a complete large scale test, lasting, if possible, for two or three days.

Mr. W. CLARK JACKSON (Neath) remarked that they had all in their younger days done a certain amount of coal testing, and so were able to appreciate the practical side of the Paper. The Author had brought his figures down to a simple basis.

Getting Full Value from Research.

Mr. FRANK WEST (Buxton) said that though, of course, the testing of coal was not a new idea, it was highly important that a Paper of this kind should be presented, because he did not think that, even to-day, full use was being made of the testing of coals in different works. It had been pointed out that coal-owners needed "keeping up to scratch," and it was also useful to have information to place before councillors or directors who might have incorrect ideas as to the suitability or otherwise of certain coals for gas making. Many times it had been found that a coal which was in one way good for the coke, was not so good for gas making, and *vice versa*. Blending in proper proportions would, however, give the desired result. He was very strongly in favour of research work, which would give ample return if the results were carefully correlated.

Mr. W. H. JOHNS (Swansea) remarked that it was very nice to be able to blend coals as Mr. Madden had done in Cardiff, but farther west they were faced with the difficulty of extra cost of carriage, and while they would like to get coals from other districts they were debarred from doing so. Therefore they were not getting the coal, or the results, that they would like to get. If they could not get the coals they wanted, he did not quite know whether the testing was of much value, except for moisture and ash. He heartily congratulated Mr. Branson on having secured a good appointment with the Cardiff Gas Company.

Mr. R. G. SHADBOLT (Birmingham) said that to his mind the two outstanding points of the Paper were: (1) It is certainly advisable to know the constituents of the commodity you are buying; and then (2) the main question is, of what value is it to you as a gas producer in the conditions under which you work? Having regard to the particular plant they were called upon to operate, and taking the normal working conditions as standard, it was necessary to ascertain whether (say) coal *a*, *b*, or *c* would be the most desirable for their own use. In this connection, the best way of obtaining a comparison under the peculiar conditions of their own particular plant became a question of vital importance. To be of commercial value, it must be on somewhat similar lines to the main method of carbonizing on that works, otherwise they might arrive at an order of suitability which would be reversed when they came to test the coals under the nearest possible approach to the conditions under which they were called upon to work.

Mr. D. MUIR (Pontypridd), proposing a hearty vote of thanks to the Author, pointed out that, even if they did have to take the coal that was offered to them, proper tests continued to act as a useful check in many ways.

(*Continued on* p. 765.)

NORTH BRITISH ASSOCIATION

Domestic Central Heating

by
D. FULTON
(Engineer and Manager of the Helensburgh Corporation Gas Department).

Presented at the Annual Meeting of the Association held at Edinburgh on Sept. 9 and 10 under the Presidency of Mr. JAMES JAMIESON (Engineer and Manager of the Edinburgh Corporation Gas Department).

I feel I ought to begin this short Paper with an apology that I may have succumbed to the strange fascination of seeing oneself in print, but a number of colleagues, knowing that we have been doing some work in the field of domestic central heating, have been anxious to obtain information as to costs. Perhaps a little against my better judgment, because a year hence our data will be fuller, I consented to provide some account of our experience and details of consumption and costs. Inconsiderable as is the amount of our experience, useful information may be provided to those who have been considering the development of a central heating load. In these times of intense competition with opposing fuels we are all on the look-out for new fields of gas consumption and the field of central heating of residences has a special appeal for those whose areas of supply do not offer possibilities of industrial loads.

The cultivation of a central heating load on a commercial basis has obvious attractions, but what constitutes a commercial basis and at what price gas must be sold for domestic central heating gives room for differences of opinion, and one of the principal purposes of this Paper is to give actual figures of consumptions already obtained from a variety of different types of installation, which may assist in creating an informed opinion and in removing uncertainty and guesswork from the matter.

It may be laid down as ultimate that in the case of domestic central heating the advantages of gas fuel cannot be obtained at lower cost than solid fuel, as there is no tangible offset to dearer fuel in the shape of labour charges saved. I find that a great many gas people incline to underestimate the efficiency of the solid fuel sectional boiler when arriving at cost comparisons. It is a great mistake to do so, as misleading oneself leads only to misleading customers, and disappointments occasioned by the non-fulfilment of expectations of low running costs are speedily reflected in the effect upon further business. Emphasis must be placed on the convenience, reliability, and cleanliness of gas, and this last quality is by no means the least important of the three. Completely automatic temperature control is a further advantage. Such advantages require to be paid for and are worth paying for.

Many of the factors which require to be weighed up to determine the true value of any load, actual or potential, are of a local nature, but certain factors apply to all undertakings whatever their circumstances. The determination of a reasonable commodity rate is possible only after consideration of all these factors, local and universal, but we have formed fairly definite general conclusions.

We consider it unsound to sell gas for domestic central heating at rates considerably below basic prices. To do so restricts action in respect of concessions in other items of cost which are of considerable importance when details of propositions are being negotiated. For instance, very frequently the charges for the provision of the gas supply and meter are heavy, for usually it is found that the larger type of house which is prepared to consider gas for central heating is situated some distance from the mains in the roadway, and it is very seldom that the existing supply is of sufficient size to carry the additional load of a gas-fired boiler. The great majority of propositions would break down if the gas undertaking is not prepared to bear all or at least some part of this cost. The expenditure is non-recurring, and I think it better business to concede all or part of the installation charges in preference to offering gas at a rate unduly below the base rates. Boilers expressly designed for gas firing are distinctly more costly than solid fuel boilers, but there is compensation in respect that no coal storage accommodation is required, and in the case of new houses the saving in space and building costs more than offsets the additional cost of the boiler. This obstacle of first cost is less readily surmounted where there is an existing installation with a solid fuel boiler, and where such a boiler is to be replaced it is rarely possible to secure the business for a gas-fired boiler unless one is prepared to lay the gas supply pipes without charge.

The financial policy of the Department and the reluctance of the Town Council to depart from the flat rate method of charging for gas has provided us with the very low base rate of 5¼d. per therm, with a discount of 7½% for quantities between 150,000 cu.ft. and 250,000 cu.ft. per annum and 10% for consumptions over 250,000 cu.ft. per annum. The discounts apply to the total consumptions. As will be seen from the statistics the price paid by the majority of our consumers who use gas for central heating is 4·725d. per therm, and having regard to the relatively small quantity of consumption which domestic installations can provide it must surely be admitted that the price is very low. Earlier when we were trying to create demand for central heating we were inclined to think that it would be necessary to sell gas at not more than 3¼d. per therm. Doubtless at that rate a very much greater load would have been obtained, but I repeat that such a measure would have been unwise. Not only is it difficult equitably to deny the demand for the benefit of any specially low rate conceded for central heating which would inevitably arise from all consumers of large quantities of gas, but no load which has within itself the elements of danger of creating the necessity of installing additional plant for a purely winter time demand can be accounted worth having at a price which cannot provide a reserve to meet expenditure for additional plant. The load we are obtaining may be increasing only slowly, but it is established, and no one who has experienced the advantages and convenience of gas central heating has shown any inclination to go back to solid fuel despite the lower cost of the latter. This proves that a fair and reasonable price can be obtained for gas and that sacrifice prices are unnecessary. The deduction to be drawn from our experience is that at 4¾d. per therm the relative costs as between coal of the ordinary washed nut type and gas is that the latter is about twice the former where price of washed double nuts is 32s. 6d. per ton in cellar, or Scottish anthracite single nuts 38s. per ton in cellar.

It is found that the great majority of the people who betray interest in gas as a fuel for central heating are those who have become weary of the stoking of the solid fuel boiler, removal of the ashes, the irregular performance, and the obligations of intermittent attendance upon it. In almost all cases, however, they are reluctant to scrap the solid fuel boiler because usually it is in quite good condition, and so they are found more ready to lend a willing ear to suggestions of converting the existing boiler to gas firing than to the purchase of a new gas fired boiler.

This brings up the question—can solid fuel boilers successfully be converted to gas firing and are such conversions efficient to the extent that they can safely be recommended? I am satisfied that a reply in the affirmative can be given, and that without being false to faith in an expressly designed gas boiler as a better job surer in performance.

It is proposed in this connection to give descriptions of conversions of solid fuel boilers which have been carried out and particulars of the running costs.

No. 1. Industrial Jet Type of Conversion.

The boiler which was converted is a Standard "Ideal" solid fuel boiler, size 1 B-5. The details of the conversion set, which is that designed by the Gas Light and Coke Company, are shown in fig. 1. Having cleaned out all flue ways and all clinker from the boiler, a simple burner consisting of two cuttings of ¾ in. barrel, each drilled and fitted at 1 in. spacing with 17 No. 3 Industrial Jets and connected through a control cock to a 1 in. burner float was rested upon the firebars. A relay valve, pressure governor, main control cock, and by-pass with tap for

pilot light, completed the special fittings. The by-pass for lighting is constructed of ¼ in. copper tube controlled by a ¼ in. stopcock. From the relay valve a ⅜ in. copper tube is carried to the hall, where the heat detector is fitted. A clock controller is inserted in the pipe between the relay valve and the room thermostat. A point in passing: On no account must the return "weep" pipe be used as a lighting by-pass, as with the functioning of the controls the flow of gas is cut off intermittently. No flow thermostat is fitted. Some brickwork is built in the firebox and flueways, and this serves a dual purpose; firstly, to deflect the heated gases against the waterways, and, secondly, to prolong the time of travel of the gases in the boiler. Finally, the ashing and stoking doors are replaced with insulated sheet steel covers.

The makers' rated output for this boiler is 117,000 B.Th.U./hr. The conversion set output rating is 82,000 B.Th.U./hr. Estimating a probable efficiency of 75% with gas of C.V. 440 B.Th.U./cu.ft. the total maximum consumption should be just under 250 cu.ft./hr. (110,000 B.Th.U./hr.). Since installation, however, it has been found possible to reduce the pressure at the burners and consequently the consumption to 210 cu.ft./hr. (92,400 B.Th.U./hr.) with satisfactory results. This brings out a point worthy of note—that it is frequently the case that not only is the rating of solid fuel boilers well in excess of actual performance but also much above the duty required of them. With gas fuel no margin is required, the efficiency and quality of fuel remaining constant.

For economical running careful regulation is required. In this instance the pressure at the burner float is 2 in. water column and the damper is set so that the flames just fail to smother. Excess draught with consequent excess air are fatal to the effective working of any gas fired boiler. Flue gas analysis and flue gas temperature will give indication of mal-adjustment.

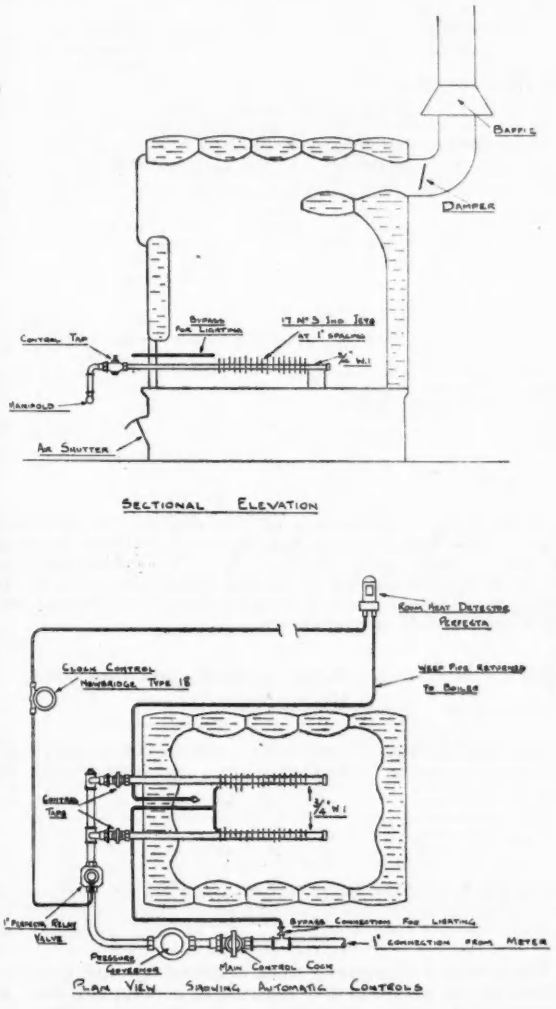


Fig. 1.—G.L.C. Industrial Jet Conversion of Ideal Solid Fuel Boiler I-GB-5.

No. 2. Selas Type Conversion.

The Selas Conversion Set was adopted for a Britannia Boiler No. 05. The burner is of radiant flame type, List No. 183/2, designed for the consumption of 185 cu.ft. per hour with gas of C.V. 440 B.Th.U./cu.ft. The firebars are removed and a firebrick structure built up inside the firebox, which results in the gases traversing the length of the boiler four times before passing to the main flue. The burner is inserted in the ash door of the boiler and the other doors are sealed up and lagged. The burner itself is constructed of multiple refractory lining blocks with a cast iron manifold, air regulator, and frame. The automatic controls adopted are similar to those previously described and the key point where the room thermostat is fixed is in the dining room. Burner and damper regulation are also similar to those adopted for Conversion Set No. 1. The makers' drillings of the jet blocks had to be enlarged, as it was found that the consumption capacity of the burner could be obtained only at a comparatively high pressure, and we think it necessary that conversion sets of this type should operate at not more than 2 in. water column pressure.

No. 3. Barber Jet Burner Type Conversion.

Our first experience of the conversion of a solid fuel firebox concerned a Cookanheat range, which, as its name implies, combines cooking with heating water for radiators, in addition to heating domestic water by means of a calorifier. The burners used were of the Barber Jet Type which we then imported from America, but which are now marketed in this country by Messrs. A. Docking & Co. under the name of Duoflam Burners. There were no automatic fittings of any kind on this job, control being entirely manual, the maintap being capable of very fine adjustment with a quadrant calibrated to a close scale. The firebox was filled above the burners with ordinary gas fire radiants, and after the initial little troubles were overcome the installation worked very much to the consumer's satisfaction—the radiator and water heating performance being excellent although the cooking part was not so good as with solid fuel. One serious trouble did arise—that in the course of time heavy condensation in the chimney showed itself on the partition wall, making it necessary to open up the chimney and run an inner flue pipe to the chimney top. Fortunately the house was a bungalow. The consumption of gas for three years is given in Table 1.

Condensation is one of the bugbears of gas fired boiler installations, and if the flue connection is to be inserted into an existing chimney it is well to make certain that the joints are pointed inside, as otherwise the moisture

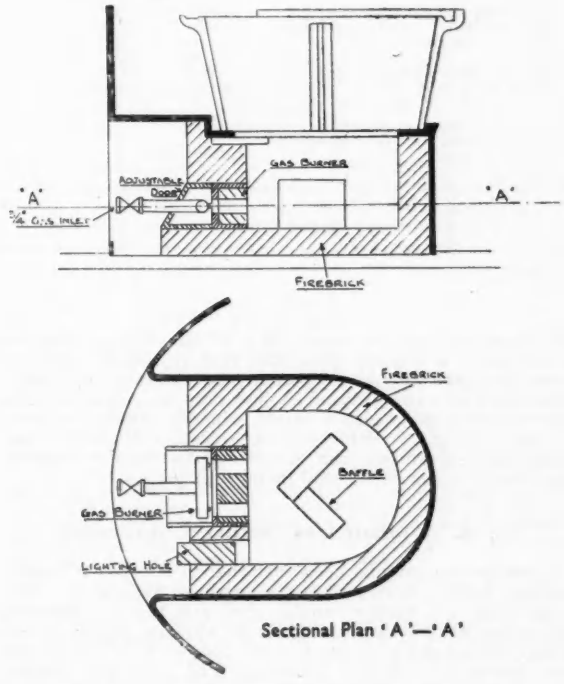


Fig. 2.—Radiant Gas Burner Applied to Pipeless Heating Boiler.

TABLE I.

		Installation.	Maximum Hourly Consumption. Cu.Ft.	Radiation, Sq.Ft.	Size of House, Rooms.	Average House Temperature, °F.	Gas Consumption per Season. 1.	2.	3.	Controls in Use.	Remarks.
Conversions.	1	Ideal 1–B–5, industrial jet conversion (fig. 1) . .	210	490	8 rooms and garage	62–63	..	100,400 10 weeks	242,300 26 weeks	Clock and room thermostat	..
	2	Britannia No. 05, conversion by Selas burner 183/2	185	430	10	65	..	68,300 10 weeks	239,100 26 weeks	Clock and room thermostat	..
	3	Canadian Wonder pipeless boiler, radiant burner conversion (fig. 2) . .	480	..	12	65	280,700 30 weeks	354,500 32 weeks	328,200 30 weeks	Room thermostat	..
	4	Cookanheat range, conversion by 2–U9 Barber jet burners.	150	..	7	63	121,100 17 weeks	391,100 52 weeks	388,700 52 weeks	Manual	Used in summer for domestic hot water and part cooking
Gas Boilers.	5	Ideal 1–GB–6 gas-fired boiler	350	750	11	63	..	26,800 12 weeks	105,500 26 weeks	Flow thermostat	Only four rooms centrally heated, boiler off overnight
	6	Ideal 1–GB–4 gas-fired boiler	210	450	9	70	..	..	363,300 30 weeks	Flow thermostat Room thermostat Clock control	House kept very warm
	7	Ideal 1–GB–3 gas-fired boiler	130	300	6	65	..	..	159,500 18 weeks	Flow thermostat	Boiler off overnight
	8	Ideal 1–GB–3 gas-fired boiler	130	300	6	63	..	..	102,100 26 weeks	Flow thermostat Room thermostat	Boiler off overnight
	9	Ideal 1–GB–4 gas-fired boiler	210	450	6	60	..	..	32,900 7 weeks	Flow thermostat	Boiler off overnight, used Mar., Apr.
	10	Ideal 1–GB 5 gas-fired boiler	250	600	7	60	..	..	44,500 11 weeks	Flow thermostat	Boiler off overnight, used Feb., Mar., Apr.
	11	3–5,040 B.T.U. boilers .	240	590	..	60	643,300 32 weeks	674,900 32 weeks	688,600 32 weeks	Manual	School

will come through and show damp on the wall. From our experience we suggest that wherever it can be done an inner flue pipe should be put in the chimney; and after experience of various types of flue pipe we are of opinion that the ordinary glazed drain pipe is much the best. Asbestos cement is liable to disintegrate with heavy condensation, galvanized iron is not nearly durable enough, and copper is too costly and inclines to fur up.

No. 4. Radiant Gas Burner Conversion.

A conversion set has been installed in a pipeless central heating boiler, Series 114—"Canadian Wonder." The boiler itself is a simple annular shell and the air heated in this space passes through ducts to various points in the house. The burner adopted is the No. 00 Radiant Burner manufactured by British Furnaces, Ltd., and has a maximum consumption of 480 cu.ft. per hour. It is placed in a small circular space in the foot of the boiler built up of firebrick. A firebrick baffle is arranged as shown in fig. 2. The automatic control comprises a relay valve operated by a room heat detector situated in the hall. There is no other filling or baffling arrangement in the boiler and the set is found to function most effectively.

Consideration of conversion sets as a whole inclines one to the opinion that if the work is properly carried out and reasonable care taken, each of the methods described provides a satisfactory unit. The most important points in the attainment of efficiency and low running costs can be enumerated as follows:

1. Pressure regulation.
2. Automatic control.
3. Minimum by-pass consumption.
4. Prevention of heat losses from boiler casing and exposed connections.
5. Lazy travel of gases in boiler allowing ample time for heat transfer.
6. Avoidance of excess air due to—
   (*a*) Too large secondary air ports.
   (*b*) Excessive chimney pull.

Table 1 gives particulars of consumption of conversion sets and gas-fired boilers, and also temperatures at which houses are ordinarily maintained. The influence of the latter is emphasized by the consumption shown in Installation 6. Table 2 gives average monthly maximum and minimum outside temperatures.

TABLE 2.—*Average Atmospheric Temperature Limits During Heating Season.*

Year.	Mean Daily Figures.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.
1934–35	Minimum . .	49	43	46	38	38	41	43
	Maximum . .	53	47	48	46	46	49	53
1935–36	Minimum . .	45	41	35	34	34	41	39
	Maximum . .	53	46	41	41	41	49	54
1936–37	Minimum . .	45	39	38	37	35	33	45
	Maximum . .	55	48	48	45	45	45	54

The question of running costs is bound up with considerations of the nature of the controls to be adopted, but our firm opinion, based on experience, is that the more fully automatic is the control the more economical will be the running cost of the installation. The automatic control parts of any conversion set cost a good deal more than the burner outfit itself, but the outlay should not be grudged, for though it is possible that manual control might achieve almost similar results the human factor fails much more often than the machine. We find that central heating engineers are inclined to be satisfied that a graduated thermostat in the flow pipe of a gas-fired boiler is a sufficient automatic control, but we ourselves endeavour to persuade consumers that it is worth while to have not only the thermostat but also a Room Thermostat operating on the relay valve as shown in fig. 3. It seems but common sense that the controlling factor should be the temperature of the house in preference to the temperature of the water leaving the boiler.

A clock control should be fitted whenever possible on the "weep" pipe from the relay valve as shown in fig. 3. It is inexpensive—the Newbridge Type 18 being very suit-

able and costing only 27s. Not only is eliminated the possibility always considerable with manual control of neglecting to turn down the burner overnight, but also it ensures that the installation is started up in the morning in ample time to have the house comfortable at the beginning of the day—an important advantage of gas over solid fuel.

When remote control is not employed a Clock controller for turning down the burners overnight if required must be fitted on the main gas supply pipe, and the larger size and cost are such that it is possible to provide remote control apparatus and a clock controller of the Type 18 for very little more cost than that of the larger controller alone.

It should be made clear that the action of the clock controller does not completely extinguish the gas burners; actually a tiny flame remains at each jet. Some consumers are of opinion that there is a very poor return for the gas used overnight and certain consumers turn the main tap off every night and re-light in the morning. The argument is that inability automatically to adjust the air supply to the quantity of gas being consumed makes for a very low efficiency from the pilot flames. It may be one of our prejudices, but we do feel that in all such installations the best economy is obtainable by the burners being either fully on or fully out. A boiler designed for a certain rating should have its maximum efficiency at that rating and must necessarily therefore be functioning at low efficiency when on 7 to 10% rated load. We consider that a great advance would be made if there was incorporated a thermostat of the type which, when it comes into operation, would extinguish the burners. Alternatively means should be proved, as is done in the case of certain standard automatic conversion sets, for automatically adjusting the air openings to the exact volume required for perfect combustion according to the varying consumption. But such methods of air adjustments are costly and are probably subject occasionally to failure.

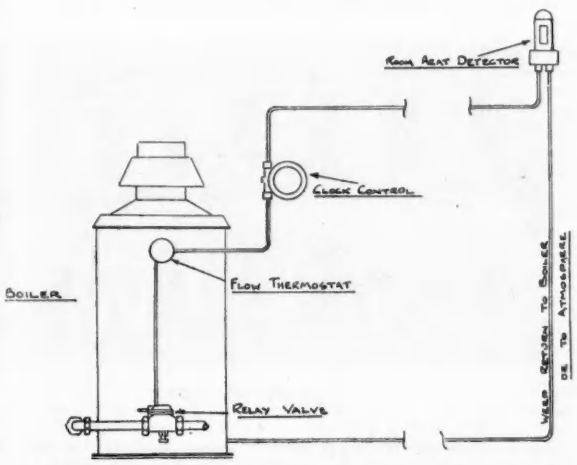


Fig. 3.—Typical arrangement of Gas-Heated Boiler with Flow Thermostat, Clock Control, and Room Heat Detector operating on common Relay Valve.

Where the room thermostat (remote control) type of control is used it is important to make quite sure that the bore of the copper tube used between the thermostat and the relay valve is of adequate size—the greater the distance between the two points the larger should be the bore of the tube to avoid lag in operation and sluggish action of the relay valve. In one of our early experiences we were much puzzled by the lack of sensitivity of the relay valve at any gas pressure below 3½ in. water column. Finally we discovered that the connecting tube was too small and that it cast sufficient back pressure to prevent the lifting of the relay valve. Tube of ⅜ in. bore was substituted for ¼ in. bore tube, and with the gas pressure reduced to only 2 in. the apparatus responded immediately to temperature changes of only 2° F.

It may not come strictly within the scope intended for this Paper, but a short reference to greenhouse heating by gas may not be out of place.

In residential areas there are a large number of small greenhouses, and heating these by means of small gas boilers like the Daisy (Richmonds), B.T.U. (Wright), or Lorne (Fenlon) is found most convenient, reasonable in cost, and a useful source of revenue to gas suppliers.

Generally, the heating of larger greenhouses by gas is too costly, but in July of last year a consumer who for three years had used gas for the central heating of his residence gave an instruction to fit a gas boiler in a greenhouse which measures 50 ft. long by 25 ft. wide by 9 ft. high to the eaves. The boiler fitted is a Solar No. 12, with thermostat in the flow pipe and remote control from the centre of the greenhouse. The working temperature is 60° F., and gas consumptions have been as follows:

July, 1936–Nov., 1936	119,400 cu.ft.
Nov., ,, –Feb., 1937	145,700 ,,
Feb., 1937–May ,, ...	131,500 ,,

Gas consumptions in greenhouses of size 25 ft. by 10 ft. average 27,000 cu.ft. per annum, and in the small greenhouses measuring 10 to 12 ft. by 6 ft., where the heating is mostly to keep frost out and protect the more delicate plants, consumptions range from 4,000 to 12,000 cu.ft. per annum.

Again, in this field the adoption of a heat detector and relay valve will not only lead to economy but is essential to the attainment of maximum service that the houses may be kept at any desired temperature. Obviously the cost of heating the larger greenhouses by gas, as the figures show, is a luxury for the rich, but every district has some few people of the type who do not grudge the cost if convenience and reliability are assured, and that is undoubtedly the case with gas.

* * * * *

Summing up, I think it may fairly be concluded that the development of a domestic central heating load is unlikely to be a spectacular growth, but rather to be slow and gradual; that its character as a variable winter load makes it better so and renders it undesirable to offer exceptionally low gas rates; that the quantity which any individual consumer can possibly use makes it commercially unsound to do so; that the running cost of gas fuel except in very specially favourable circumstances must considerably exceed the cost for solid fuel; and that in putting forward propositions frankness and candour are imperative.

Discussion.

Mr. George Braidwood (Coatbridge) said that when members of The Institution of Gas Engineers visited America they found that in Chicago many solid fuel boilers were being converted to gas. In Coatbridge they had an all-gas house of 6 or 7 apartments worked on the 2-part tariff, with 3d. per therm for service charges. Lighting, heating, cooking, and water heating were involved, and 247 therms were used in the September quarter, 650 in the December quarter, 762 in the March quarter, and 381 in the June quarter, a total of 2,047 for the year at a cost of £29 11s. 9d. Helensburgh in 1929 got an Order enabling them to sell by the therm, yet Mr. Fulton still quoted cu.ft. volume. They should cut this out and get up to date.

Mr. T. Carmichael (Portsmouth) said that domestic central heating, as Mr. Fulton had said, could not be supplied at a special price. He also agreed that many were inclined to underestimate the efficiency of solid fuel. If they had Mr. Fulton's opinion of efficiencies, the information would help them to establish comparative costs.

Mr. A. B. Munro (Edinburgh) said that if they gave no special rate to gas fire users they could not give it to central heat consumers. They should encourage the central heating load. In Edinburgh they found the expense, compared with solid fuel heating, was against it. Like Mr. Fulton, they had trouble with condensation, but this could be cured, at extra expense. There was a field of opportunity open to them in air-conditioning service.

Mr. A. C. Rea (Perth) said they could use coke in competition with coal more usefully than gas so far as central heating was concerned. In Perth he had just quoted for the heating of a school, but had been told that the cost was double that of solid fuel heating.

Mr. W. D. Rowe (B.C.G.A.) said that a Paper on this subject had been given at Bath last year by Alderman Carver, of Leicester, and that it had appeared in the Technical Press.

Mr. J. J. Scott (Cowdenbeath) said Mr. Fulton's Paper showed that gas had utility for all purposes. Mr. Fulton's price was very low and the price question had everything to do with it.

Mr. Fulton, in reply, said he he would have liked to approach the question from the point of view of the 2-part tariff, but his Council did not favour this scheme. He would average the efficiency of solid fuel at 45%. The demand for central heating would grow, for people wanted comfort in their homes. Their make in Helensburgh was about 177 million cu.ft., of which 3,145,000 c.ft. went in central heating.

NORTH BRITISH ASSOCIATION

NOTES ON THE DESIGN AND CONSTRUCTION OF

The Dundee Gas Showrooms

by
J. WILSON
(Engineer & Manager of the Dundee Gas Department).

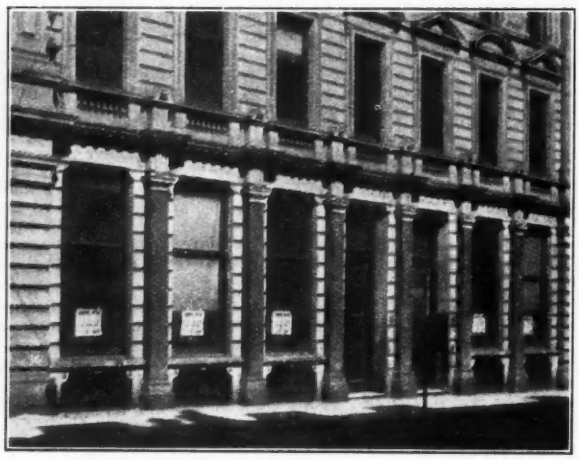
Presented at the Annual Meeting of the Association held at Edinburgh on Sept. 9 and 10 under the Presidency of Mr. JAMES JAMIESON (Engineer and Manager of the Edinburgh Corporation Gas Department).

A modern gas showroom had been receiving the attention of the Gas Committee for some time, but it had not been possible to acquire suitable premises until the centralization of certain Municipal Departments round the New City Square rendered vacant the premises formerly occupied by the City Collector in Commercial Street. This property had at one time belonged to the "Gas Commissioners," and the gas accounts were paid there to the "Gas Treasurer."

Later, the Gas Treasurer became the "City Collector," and all City rates were paid in this office. So that, apart from the premises being capable of reconstruction to turn them into modern showrooms, they retained a sentimental value in that they are still referred to among the older people as "The Gas Office."

Design of Layout.

The premises as used by the City Collector had one entrance door on the east side of the stairway leading to the flats above, and the main collecting hall ran from the front to the back, including an annexe beyond the line of the main building. The premises to the west of the stairway were partitioned and used for office purposes. Our first design continued this arrangement, utilizing the whole of the east section as a large showroom with one window to the street. This was discarded in favour of the present layout, which incorporated the rising stairway in the centre of the frontage. This gave two large street windows, with separate entrances on either side of the centre doorway to the stair. It was further decided to make this doorway a centre feature of the complete façade. By building a wall across the east section in line with the existing main wall at the rear of the west section we obtained two approximately equal rectangular *salons* on either side of the main stair and connected to each other by a broad passage underneath the stair landing.



Frontage prior to Alteration.

The size of each of the two rectangular *salons* was 33 ft. long by 24 ft. wide and 15 ft. high, and the connecting passage 12 ft. long by 14 ft. wide and 8 ft. high. The windows were 16 ft. long by 8 ft. 6 in. high to the transom, and a further 3 ft. 3 in. to underside of window blind casing just below the granite fascia. The section above the transom was of obscured glass etched to a symbolic design suggested to us by the officials of the B.C.G.A.

The introduction of the built-up steel supporting columns caused recesses to be formed behind them. Advantage was taken of the recesses adjacent to the entrance doors to construct additional pocket windows for the display of lighting fittings and other small appliances. The recesses at the outer ends were used as cupboards to house the window lighting controls and to give access to the space above the window lights.

Frontage and Windows.

The showroom is on the ground floor of a four-storey building, the upper flats being used as offices and dwelling

Frontage after Alteration.

house. Strong built-up girder beams had to be inserted in order to support the building, and these were in turn supported at each end on steel built-up columns. The original entrance and office windows were then demolished and the ground cleared for the fitting in of the two new large windows and entrance doors.

The window frames and astragals were constructed of bronze section with stainless steel fillets and the surrounds were finished in slabs of granite. The top sign or fascia and side surrounds of the two windows were carried out in Ailsa Craig granite, the fascia being carried continuously right across the top of the centre stair doorway. This doorway was faced with a pleasing design in Rubislaw granite, while the plinths down to pavement level were finished in Black Swedish granite.

The Ailsa Craig granite, coupled with the window frames, gave a very artistic treatment in green and bronze. The warm grey of the Rubislaw, while toning very nicely with the Ailsa Craig, brought out the doorway as a distinctive centre feature of the complete frontage.

The work entailed in the temporary support of the building, the cutting out and insertion of the steel columns and beams, was an exceedingly tricky operation, and great credit is due to the contractor for successfully completing his work without any disturbance to the upper parts of the building.

Owing to the cross supporting girder being immediately behind the granite facing slabs, it was not possible to introduce a gas system of illuminated sign. The sign therefore consists of bronze letters of shallow channel section filled in with red enamel fixed approximately 1 in. from the granite face. We did not feel that this inability to have an illuminated sign was, after all, such a disadvantage, as it enabled us to concentrate on good interior

lighting which was the more effective because it had not to compete with an outside advertising attraction.

General Construction.

The walls and ceilings were first of all stripped and, as we had discovered that most of the uprising flues had been cut through owing to alterations to the offices immediately above, it was decided to put in a completely new system of flue ducts. In order to get the necessary accommodation for these, the ceiling was lowered some 20 in. and new walls framed out from the stone walls of the building. The ceiling and wall framework down to a height of 5 ft. above floor level was covered with plaster boarding as a foundation for the plaster work, which was carried out in

Communicating Hall, looking East.

hard wall plaster suitably panelled. The upper structure is thus of a permanent nature, sufficient change being obtained by colour treatment from time to time.

The decorative woodwork of the showroom consists entirely of Austrian oak. At the 5 ft. level there is an oak dado rail separating the permanent upper portion from the lower, which is so designed that it can be easily and cheaply altered if desired at any time. This has been achieved by using Masonite Tempered " Presdwood " as a foundation and planting oak mouldings thereon to give a panel effect. A deep oak skirting board in sections is screwed to the framework in order to give easy access to the main gas connections.

The original floor consisted of concrete, covered in the main Collecting Hall with mosaic in certain sections and by wood flooring in others. These were all cleared away, leaving the concrete exposed, and on this foundation wooden bearers were laid to carry the new floor. Three inch broad hard oak flooring was used to cover the window recesses, the passage-way between the two *salons*, and the surrounds. The centre piece of the floor of each *salon* consisted of heavy section linoleum of special design. The linoleum was laid in a recess in the floor so that a level surface was maintained throughout.

Communicating Hall, looking West.

Having in view the using of one *salon* for gas fires, radiators, and other heating appliances and the other for showing cookers, wash boilers, water heating equipment, &c., the treatment of the linoleum was different on each floor. In the gas fire, &c., section, the linoleum consisted of a main ground of beige colour, with a border of broad black at the outer edge adjacent to an inner strip of dark brown. In opposite diagonal corners were triangular strips of black, chocolate, beige, light brown, and biscuit, once repeated. At the other corners, but nearer the centre, were set-in three diamonds in line mitred to each other, in biscuit, light brown, and chocolate, linked together by a *motif* of parallel lines intersected by diagonals.

In the cooker and water heater section, the linoleum consisted of oak Jaspé squares, with inlay of narrow navy blue edging. The border treatment was strips of light blue and orange, alternating with beige and biscuit. The centre *motif* is a blue and orange cross-piece interlocking with a double " S " in beige and biscuit. Four corner *motifs* in same colour complete the design. These two floors were specially designed for us by the Korkoid Decorative Floors Company.

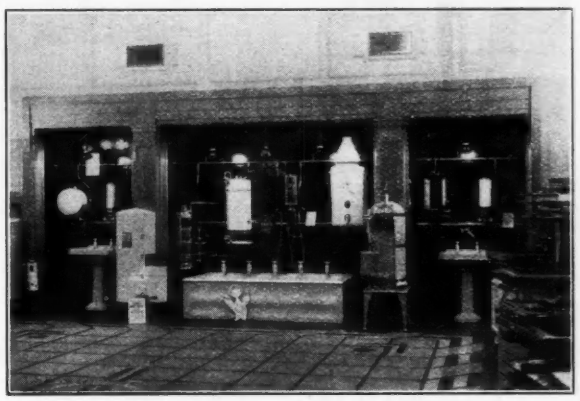
The passage way between the two main sections caused us at first no little concern. The passage measured 12 ft. long by 14 ft. wide by some 8 ft. high, and in the middle were four 6 in. diameter cast-iron columns supporting the landing of the main stair to the upper flats. Eventually the difficulty was got over by treating this passage as a special feature in the general design of the interior decoration.

The unsightly cast-iron columns were encased in octagonal oak pillars with corresponding pilasters on the side walls, supporting a broad decorative architrave at each end, thus forming an attractive entrance from each *salon* to the passage-way, giving it the effect of a small circulating hall from which access is gained to the offices at the rear and also to the storeroom in the basement.

A specially designed cabinet counter for parcel tying, holding of catalogues, and cash register, found its rightful place in the centre of this hall.

Water Heating.

Various ideas of a water heating display were considered, but it was felt that the bath and wash-hand basin had still



Water Heating Section.

much to commend them. The brick wall which was built to square the showroom premises on the east side gave a natural recess at the back of this *salon* opposite the display window.

The treatment of oak pillars and architrave which successfully overcame the difficulty of the passage was also incorporated here. The recess was divided into three by two octagonal pillars. The large centre recess containing a square bath in " Lexos " amber colour finish while the two smaller side sections each gave accommodation for a pedestal wash-hand basin in similar colour.

It was originally intended to finish the back and sides of the water heating recess with glazed asbestos. Unfortunately we were unable to obtain the material we desired in sheets large enough to suit our purpose. We used instead Masonite Tempered " Presdwood," and gave it three coats of flat black and two coats of glossy black " Permoglaze," and I am pleased to say that the resultant good finish is being well maintained.

In designing the display for water heaters we did not want to be tied to a permanent arrangement. It is not possible to show at one time all the different types of heaters available and consequently the arrangement must be sufficiently flexible in order to allow for frequent change.

The method we used is as follows:

Two 1½ in. diameter " Yorewyte " tubes were run horizontally along the back about 2 in. clear of the wall strongly supported where they pass through the pillars and

also by keepers equally spaced along the length and securely screwed into the back framework. These tubes are set 2 ft. 6 in. apart and are sealed at one end, the other end being connected to the water and gas supplies. The top tube rail contains the water and the bottom the gas.

Connections are inserted at suitable intervals to allow for connecting up eight different water heaters. These heaters are fixed to, and supported by, perforated steel straps hooked on to the upper rail and clamped to the lower one. It is thus a simple matter to change from any type of heater to another without interfering with the main structure in any way.

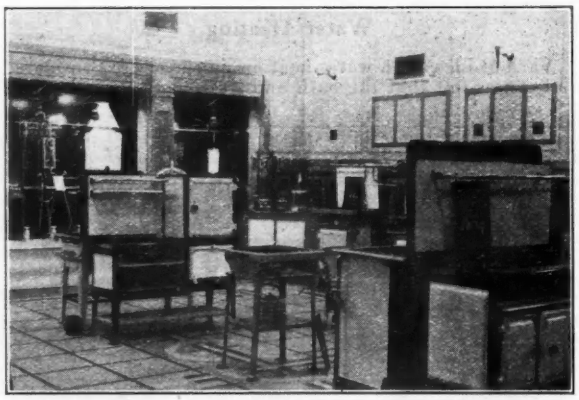
The bath has no taps fixed thereto. Four hot water taps and one cold water tap are fixed direct to the back panel and connections from the various heaters are run to them. All piping is therefore visible and the intending purchaser is left in no doubt as to which heater is supplying the hot water.

The centre recess over the bath is used for the larger types of multi-point and single-point heaters and circulators, while the adjacent recesses over the wash-hand basins accommodate the smaller sink heaters and hairdresser's equipment.

Cooking, &c., Section.

Along the side walls of this section there are ten removable panels below the dado rail and five above, behind which are available flue ducts. Almost any type of cooking and washing appliance can therefore be fitted and demonstrated under working conditions.

On occasion the centre floor of this *salon* can be cleared of equipment, and it then becomes a very useful demonstration hall for practical lectures on cookery, refrigeration, &c. It can seat 100 people comfortably, although I



Cooking Section.

am afraid public interest has on many occasions caused this number to be exceeded.

Gas Fire and Radiator Section.

Below the dado rail the design using Masonite "Presdwood" and oak mouldings is similar to the other *salon*, except of course accommodation is provided for eight live fire units of different designs.

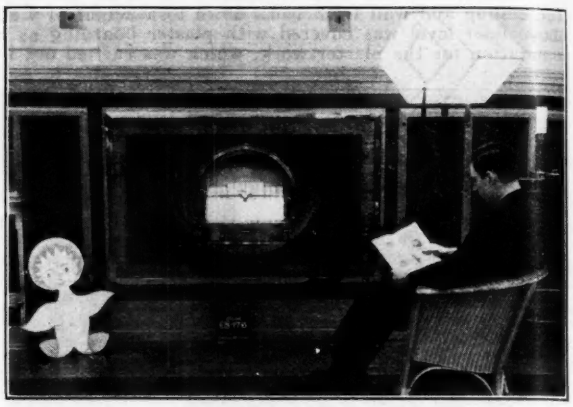
The centre unit on the west wall is a permanent built-in fitting of a Main's "Gloria" Fire in armour bright finish with panel surround in black and dove grey marble. On the opposite wall a Davis "Sunsquare" fire is also permanently built in with a panel surround of black and grey marble.

Five of the remaining six fire units are constructed to permit of easy change both in surrounds and hearths or even in the case of two, from hearth to panel type. These fire-places have a brick backing on to which is built a galvanized iron hood connected to the flue ducts behind the framed out walls. Two have flat moulded oak mantel surrounds of simple design, while the other three have surrounds of wood cored stainless steel section. This stainless steel section is used as a feature on all the fire units and also for the kerb of the removable hearths. It is also used to tie in the movable surrounds, which can be of glazed asbestos, synthetic marble, stone, or sheet metal, as allowance is made to deal with the different thickness of these materials. In the case of the hearths, the stainless steel section is mounted on to a base of "Presdwood," and the actual hearth required is slipped in and held in position. The complete unit of hearth and kerb is then laid on top of the floor and does not require any fixing. The remaining fire unit vents into a chimney; advantage was taken of this to build in an ordinary slab tile fireplace, hearth and kerb, so that a coke-burning grate can be shown during the winter months.

In addition to these fire units, there are also eight removable panels, fitted with available flue ducts behind, so that radiators or other appliances requiring a flue can be demonstrated at any time.

Display Stands.

In the Gas Fire Section there is unfortunately a cast-iron pillar, some 9 in. in diameter, supporting a reinforced



The Main's "Gloria" Fire

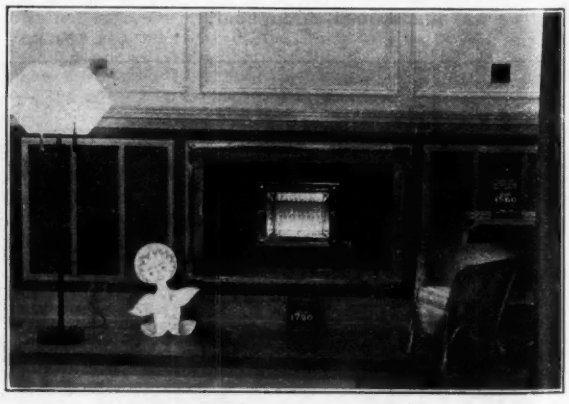
floor for the office above. This could not be removed, so a hexagonal display stand 3 ft. high was built round it. Each vertical side contains a miniature surround and hearth, built on similar lines to the main fire units. There is also a similar stand placed on the floor in an offset position to give balance. With these two stands we are able to show twelve different colour treatments of surrounds with fires to tone.

Display Windows.

The main floor is carried right through at the same level into the window recess, so that we can either have a "closed" or "open" window. Each window can be "closed" by means of curtains carried on an adjustable rail and supports constructed of "Yorcwyte," tubing $1\frac{1}{4}$ in. diameter, with chromium plated gun metal hinges, brackets, and floor sockets. The construction is so designed that the drop curtains can be moved back to increase the depth of the window from 5 to 8 ft.

Lighting.

The main lighting in each *salon* is by means of six 10-light Sugg's "Tintern" square ventilating ceiling lamps,



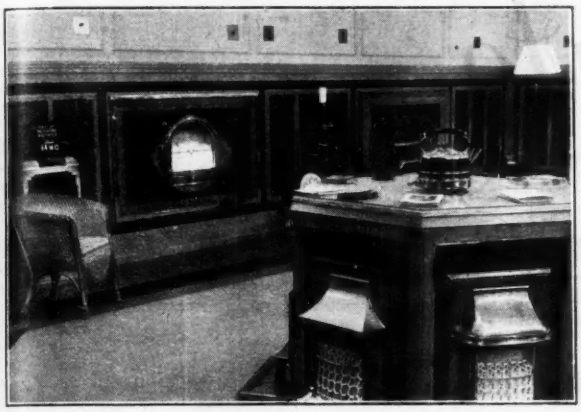
The Davis "Sunsquare" Fire.

operated in pairs by Sugg's distance control. Round the walls are seven 3 No. 2 mantle "Flambeau" type wall brackets, six upright twin cylinder and two upright single cylinder type brackets. All these auxiliary lights are controlled by "Newbridge" switches, with catalytic ignition.

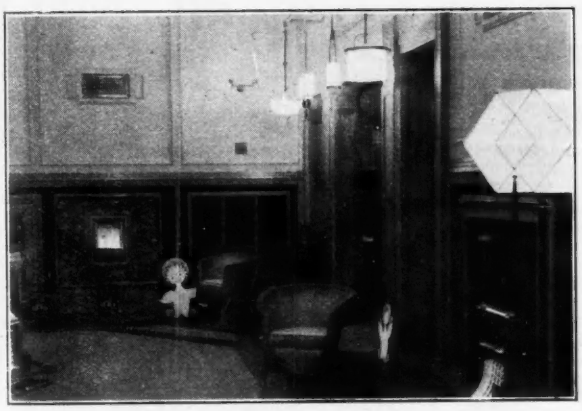
The water heating section is lighted by means of four two-mantle burners, with metal parabolic shades directing the light into the recesses, thus causing the various appli-

ances to stand out against the black background. They are suspended immediately below the oak soffit between the pillars, and in the centre there is a Sugg's "Dekorlyte" fitting with the glass panel etched "Gas for Water Heating." With an "open" window, this arrangement provides an excellent background at night for a water heating display.

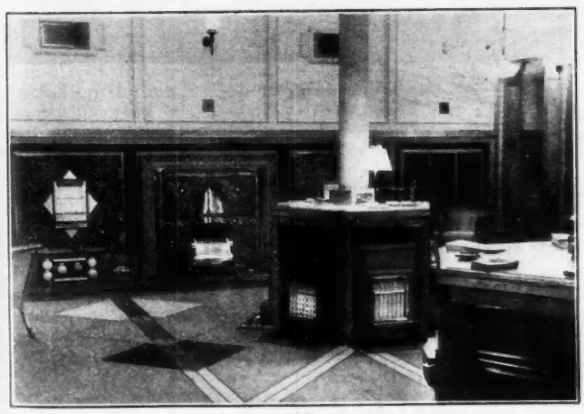
There is also a gas illuminated clock as a feature on the main side wall of each *salon*. The main lighting in each



"A"



"B"



"C"

"A," "B," and "C"—Showing the Five Remaining Fires.

window consists of three 8-mantle trough lamps of special design placed in suitably constructed recesses in the window soffit; one control operates both outside lamps while another operates the centre lamp. We can thus have one, two, or three in use as required. In addition, there are six 3-mantle directive lamps hung under the soffit immediately behind the top decorative window panels. These are also fitted with two controls so that two, four, or six can be in use. There are also two 4-mantle spot lights in each corner in line with the directive lamps, each separately controlled.

In designing the control of the window lights, the service pipe operating each set was carried down through the cupboard at the side of the window and a time clock inserted in each. We see now that this was unnecessary and we intend to reduce the number of time clocks to two, one for the main floods and the other for the battery of directive lights, using Sugg's control cocks to operate by hand the arrangement of lighting required to suit the varying needs of different window displays.

Each entrance vestibule is lit by an 8-mantle "Tintern" ceiling lamp. All these lamps are of the ventilating type. The products from each window are carried off by flue ducts into two separate chimney flues available in the building, and do not interfere with the main ventilating system. It is thus possible to leave the window lights on at night when the showroom is closed and the main ventilating system shut down.

The arrangement of a display of domestic lighting fittings caused us some considerable thought. Because of the high ceilings in the main *salons*, it was not practical to have pendants suspended therefrom, and the ceiling height in the centre hallway was too low. Eventually it was decided to design two special bracket rails for fixing to the walls above the architrave at each side of the communicating hall. These rails are made of 1¼ in. square section brass tube chromium plated, and are held out 15 in. from the wall by two branch pieces of similar section connected to the main rail 5 in. from each end. Further support is given by two decorative 1 in. by ¼ in. flat bronze hangers screwed to the wall above and clamped to the rail at 4 ft. 10 in. centres. The end of the branches next the wall are flanged, one being sealed, allowing the other to provide the gas connection through the wall.

Two beads are brazed along the topside of the rail forming a hollow channel in which the wires for "Webson" switches are concealed. The flange at the service branch is slotted to allow the wires to pass through the wall, the button controls being fixed to the oak pilasters flanking the hall. Each rail has drop connections for a display of four different pendants.

The communicating hall is lighted by means of four bracket fittings of distinctive design fixed to the face of the inner panel of the octagonal pillars.

Gas Services.

From the meter all the gas and water service pipes are copper. The main service is run round the showroom at floor level immediately behind the sectional skirting boards. From this, cock-controlled branch pipes are taken to supply the various heating, cooking, and lighting equipment.

The original 2 in. gas service into this building is used as a separate supply to the water heating section, and a new 4 in. service was run into the basement to give the main supply. By this means sudden demands for gas due to the operation of the larger multi-point water heaters are confined to the water heating section itself, and do not interfere with the main supply to the showrooms.

As a matter of interest, it may be mentioned that as all the piping is of copper, all exposed pipes, particularly in the basement, are painted different colours in order to show at a glance the purpose for which each is used.

Below each removable panel there is a flush fitting bayonet plug-in cock placed immediately above the skirting board, so that tube connections can be made at some twenty different points round the walls of the showrooms. There are also three similar cocks fitted to the top of the display stand built round the cast-iron column already mentioned; the service to these three cocks is run down the inside of the column from the ceiling above.

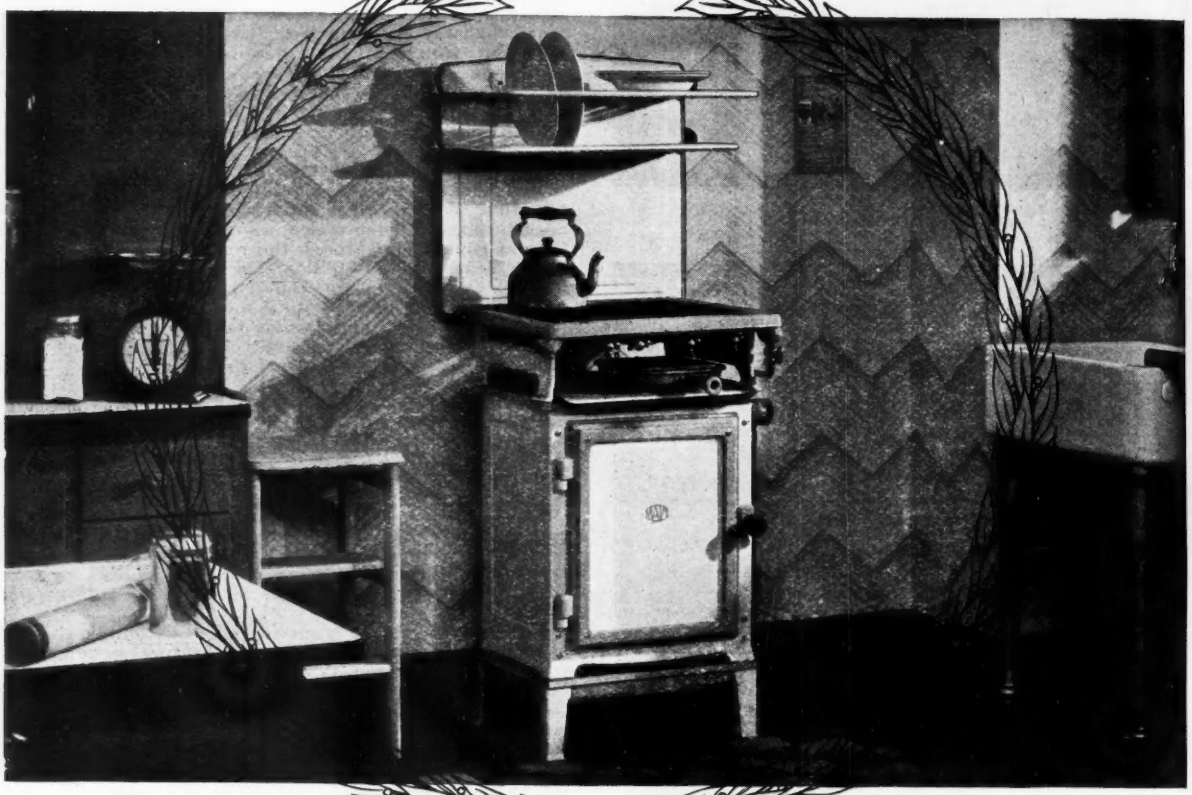
In order to keep the socket of these plug-in fittings clean and free from dust when not in actual use, we designed a special plug cap to close the socket when not connected to an appliance. It is fastened to the panel by a thin ball chain, and, in our opinion, is a decided improvement.

Ventilation: Foul and Fresh Air System.

With the exception of the coke fire and the window lights which exhaust into existing chimneys, all other equipment requiring flues is connected to a special exhausting flue duct system connected to a fan. As the system had to be housed in the existing building and accommodated between the ceiling and the floor above and also between the framed out walls and the existing stone walls, great care had to be exercised in design in order to get the necessary velocity with the minimum of noise. Fortunately, we had in the person of our Fittings Superintendent a man who had made a special study of such problems, and I can assure you that the system is working most satisfactorily.

The ducts are designed to produce smooth streamlines

Tribute to a fine product



A customer writes

"..... Am delighted with my (large size cream and green) Cooker. Have had it 12 months now—most economical to run, easy to cook with, and a beautiful adornment for my kitchen.

A friend seeing mine ordered one at once, and is equally delighted.

Thanking you,

(Mrs.) G. J. B."

MAIN

Sussex Gas Cookers

R. & A. MAIN LIMITED, LONDON AND FALKIRK

London Office and Showrooms: 48, Grosvenor Gardens, S.W.1 Glasgow Office and Showrooms: 82, Gordon Street

without sudden sharp turns or sudden changes of section, all junctions are pitched at 45° to the main trunk, and all hexagonal bends are streamlined at the throat. The ventilating ceiling lamps are connected to the foul air shaft by round pipes transformed to the hexagonal of the main shaft. The largest round pipe is 12 in. diameter and the smallest 6 in. All drops and risers are rectangular in shape and are approximately 6 in. by 3 in., the shape and size of these being regulated by the space available behind the wall framing. The metal used in the construction of the ducts is 22 w.g. patent flatted galvanized steel sheets. This gauge is rather heavier than usual, but was purposely selected to give long life.

The whole system is operated through a 1¾ h.p. motor driven fan and controlled by dampers, sluice dampers being used on all the uprising ducts, while double slide dampers control the ventilating lamp flues.

There is also a fresh air supply system fed through special bronze grills set in the plaster panels of the walls about 8 ft. high from floor level in order to maintain the pressure balance of the air inside the showrooms and thus eliminate draughts.

Fresh air is drawn in from the outside through an oil filter by a 1¾ h.p. motor driven fan, and is conveyed by ducts above the ceiling to the bronze grills in the showroom.

In very cold weather the air is warmed by a gas-operated heater unit designed by the Gas Department. This heater is made of 22 w.g. cold rolled copper and is fitted with 18 No. 3 Bray's geyser burners. The degree of warmth is controlled by an ordinary gas cooker thermostat fixed across the flow. Both foul and fresh air fans are set to give a pressure of 9/10 in. water gauge.

The "Metro" Log Fire.

In order to maintain a safe and fresh atmosphere in the space between the ceiling and the floor above in which the main ventilating ducts are housed, twelve "puffers" are fitted on the main fresh air ducts and twelve extractor cones are inserted in the main exhaust flues.

This arrangement ensures a good air movement in the space and keeps it safe for routine inspection.

Offices, Workshop, and Stores.

Below the showroom and annexe there is a splendid basement. This has been fitted out to provide accommodation for a store for the showroom. There is also room for a meter and general fittings store, and a workshop for the Department's Meter and Complaints Section.

The annexe at the back of the showroom contains a private office for the Showroom Manager and a general office for receiving all enquiries and complaints. Access to this office during the day is through the showroom by means of the communicating hall, and at night the man on duty receives any message direct from the rear entrance.

Conclusion.

The architectural design of the showroom and window frontage was carried out by Mr. J. McLellan Brown, A.R.I.B.A., Depute City Architect, to general ideas submitted by the Gas Department.

The actual reconstruction work was done by contract. The Gas Department designed and carried out all the work of gas and water services, the ventilating system, and the fitting in of all the "live" heating, lighting, and water heating units.

The Author trusts that these notes may prove of interest and perhaps assistance to any who may be contemplating the construction of a showroom. If such should be so, he is amply repaid for preparing them.

Discussion.

Mr. W. D. Rowe (B.C.G.A.) said he remembered when the Association met at Dundee some years ago what kind of a showroom Mr. Wilson had had to put up with in a side street. Now he had premises which would be very helpful to him in the development of sales. He was sorry they had not a room entirely set apart for demonstrations. This room could have been used for women's meetings and could have become the rendezvous for housewives.

Mr. A. B. Munro (Showroom Manager, Edinburgh) said showrooms existed to create the desire to possess. Gas managers could not do wonders with unsuitable premises. The public were realizing that those in the Industry were up to date, not only with regard to the utility of their product, but in their method of presenting it.

Mr. A. McDonald (Motherwell) said most of them who had showrooms found them a paying proposition. From his own experience he could say that adequate flues were necessary in a showroom. The Paper would have been additionally valuable if it had given some idea of the cost of the Dundee scheme and the results that had accrued.

Mr. David Fulton (Helensburgh) said that good showrooms were essential for their status and prestige. They should be prominently situated and not in back streets.

Mr. John Barker (Nairn) spoke of one place where the showroom was open only half the day. That was no use. They must keep shop hours. There should be a live showroom in every town. Two years ago they rented a shop in Nairn at £70 a year and spent £270 on reconstructing it. Some of his Directors thought it would not pay, but it had shown a handsome profit.

Mr. James Bridge (Elland) said that appliances must be displayed in a dignified way and in a simple style, so that rich and poor alike knew what was available. He considered it an advantage to have a lady assistant in attendance.

Mr. Wilson, replying to the discussion, gave details of the costs incurred in connection with the Dundee scheme. The structural work had cost £3,400, which included architect's fees; and £2,499 had been spent on appliances, lighting of *salons* and windows, linoleum, showroom stores, and the flueing arrangements, the latter running into four figures. The total cost involved was about £6,000. Against that there was a 59% increase in the sale of appliances during the year following the opening of the premises, the value of the sales rising from £8,887 to £15,776. The showroom had therefore been worth while. Their windows were changed fortnightly and sometimes weekly. They had both male and female assistants.

Gas Fires for the Coming Season

New List of Messrs. R. & A. Main

There is a warmth of colour about the new season's list of Messrs. R. & A. Main, Ltd., 48, Grosvenor Gardens, S.W. 1, which attracts attention at the most casual glance. A great number of the fires detailed in the list are shown in artistic settings; the first one to be so shown is the "Fire King." This series incorporates a group of designs of simple and refined appearance, without any projecting canopies. They are suitable for fitting to almost any style of modern interior, and are the result of incessant research and experiment, directed to increase radiant efficiency and reduce heat losses. There is a simple and effective self-lighter incorporated in the canopy. The "Panamain," on account of its flush fitting, can be installed at any height above the floor, saving valuable room space since it requires no hearth. An attractive modification of the "Panamain" is the "Starmain."

Offering distinct possibilities to the architect or builder in his decorative treatment of the fireplace, the "Gloria" has been conceived by a skilful handling of circles and half-circles in various checks to produce light and shade. This fire can also be fitted at any height from the floor to conform to any proportion an architect may desire. The "Glowmain" is an effective and convenient portable heater with a consumption of 12·5 cu.ft. per hour. The heating element is distinctive and strongly made, consisting of a wire coil of special shape supported along its axis on a steatite tube strengthened by a rod of special material. Other portable fires include the "Newscreen" and the "Mainscreen."

An interesting device is the "Gasclock," which is claimed to be the most compact portable prepayment heating unit yet devised for use in the bedrooms of hotels and boarding houses. It operates by means of a time-clock and a sixpenny piece. This small device is fitted to the portable fire, and the insertion of a sixpenny piece opens the gas-valve and winds the clock for a run corresponding to the length of time set to be prepaid. Every coin inserted registers a "time period" on the unused gas dial. The device can be adjusted to suit the proprietor. Included in the list is a useful chart of coloured paint finishes.

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Gas Undertakings' Results

Chesterfield.

The annual report of the Engineer and Manager of the Chesterfield Gas Department, Mr. H. Davies, for the past year, states the outstanding feature is the continued increase in the sales of gas, which amounts to 78,205,000 cu.ft., or 15·43% over the previous year. This is the third year in succession when the increase in gas sales has been very substantial, the past year being well in excess of the previous two. The industrial demand for gas has increased by 53% and now totals 186½ million cu.ft., or 31·8% of the gas accounted-for. The demand for gas for central and bath heating has increased by 111½% and totals 40¼ million cu.ft., or 6·9% of the gas accounted-for. The large additional demands have been met mostly by increasing supplies from the coke ovens, for which purpose a portion of the main conveying this gas was enlarged from Storforth Lane to Boythorpe Lane by the laying of 1,112 yd. of 12-in. steel main. The yield of gas and by-products from the type of coal carbonized is good, the value of the latter representing 72·4% of the cost of each ton of coal used. The unaccounted-for gas represents 5·69% of the total sent out, and is rather below the average figure for the past seven years. The total net working expenses per therm sold has been reduced during the year by 0·55d., and the average price per therm realized is less by 0·61d. The net result of the year's working amounts to £3,427, and the sum of £2,631 has been spent out of reserve fund on work of a non-recurrent nature.

Coatbridge.

The Directors of the Coatbridge Gas Company report that for the year ended June 30, 1937, the sales of gas amounted to 1,508,583 therms. The payment of final dividends at the rates of £9 5s.% actual on the original stock, and £6 9s. 6d.% actual on the four issues of £10 shares, all less income-tax, have been recommended.

Dublin.

The annual report of the Directors of the Alliance and Dublin Consumers' Gas Company for the half-year ended June 30, 1937, states that the accounts show a profit of £78,150 on the revenue account, and after providing for interest on Debenture stock, there remains the sum of £70,670, to which must be added a credit from interest amounting to £217, a credit from income-tax amounting to £1,349, and the sum of £50,291, being the balance brought from the last account, making a total of £122,527. The Directors recommend the declaration of a dividend on the consolidated ordinary stock of the Company at the rate of £8% per annum, less income-tax, which will absorb the sum of £70,698, after which a balance of £51,829 will remain to be carried to the next account.

Dunfermline.

The annual report by Mr. James Campbell, Engineer and Manager of the Dunfermline Gas Department, states the income for the year ended May 15, 1937, amounted to £85,992, and the expenditure to £67,345, leaving a gross profit of £18,648. To this sum was added unemployment grants of £652, making a total credit of £19,299. From this there fell to be deducted sums in respect of repayment of loans, interest, income-tax, and expenses of loans funds, amounting in all to £15,785, showing a surplus on the year of £3,514. From this sum there has been transferred to reserve for retort repairs £1,500, and to reserve for income-tax £500, leaving to carry forward £1,514. Adding the balance from last year of £339, this gives a credit balance to next year of £1,853. The total amount borrowed by the Gas Department to May 15 last amounted to £350,845, of which £252,521 has been repaid, leaving £98,324 outstanding, equal to £228 per million cu.ft. of gas made, compared with a corresponding figure of £585 in 1918. The quantity of gas made as per station meter was 430 million cu.ft., an increase of 16,123,000 cu.ft., equal to 3·89%. The average yield of gas per ton of coal was 18,139 cu.ft. per station meter. The net income from residual products amounted to £17,135, equal to 14s. 5·5d. per ton of coal carbonized, or 73·89% of the cost, making the net cost of coal 5s. 1·3d. per ton. The sale of gas appliances in the showrooms again shows an increase.

Sowerby Bridge.

The annual report of Mr. W. B. Harrison, Engineer and Manager of the Sowerby Bridge Gas Department for the year ended March 31, 1937, states the expenditure on revenue account has been £31,125 and the income £34,695, leaving a gross profit of £3,570. Interest on loans amounted to £486, sinking fund contribution, £1,680, income-tax, £633, and purchase of new van £168, resulting in a net profit of £1,846. The total quantity of gas manufactured during the year was 224,957,000 cu.ft. The total quantity of gas consumed during the year was 225,325,000 cu.ft., an increase of 9,356,000 cu.ft. on the previous year, equal to 4·33%. Residuals realized the net sum of £9,366, equal to 13s. 0·2d. per ton of coal carbonized compared with £6,857 and 10s. 6·6d. per ton for the year 1935-6. The increase is largely accounted for by the improved coke market. The number of public gas lamps in the Council's district totalled 655 at the end of March, 1937; of these 505 were hand lighted and 150 clock controlled. The total value of appliances sold during the year was £5,091, compared with £4,140 for the previous year, a total increase of £951, equal to 23%.

Stretford.

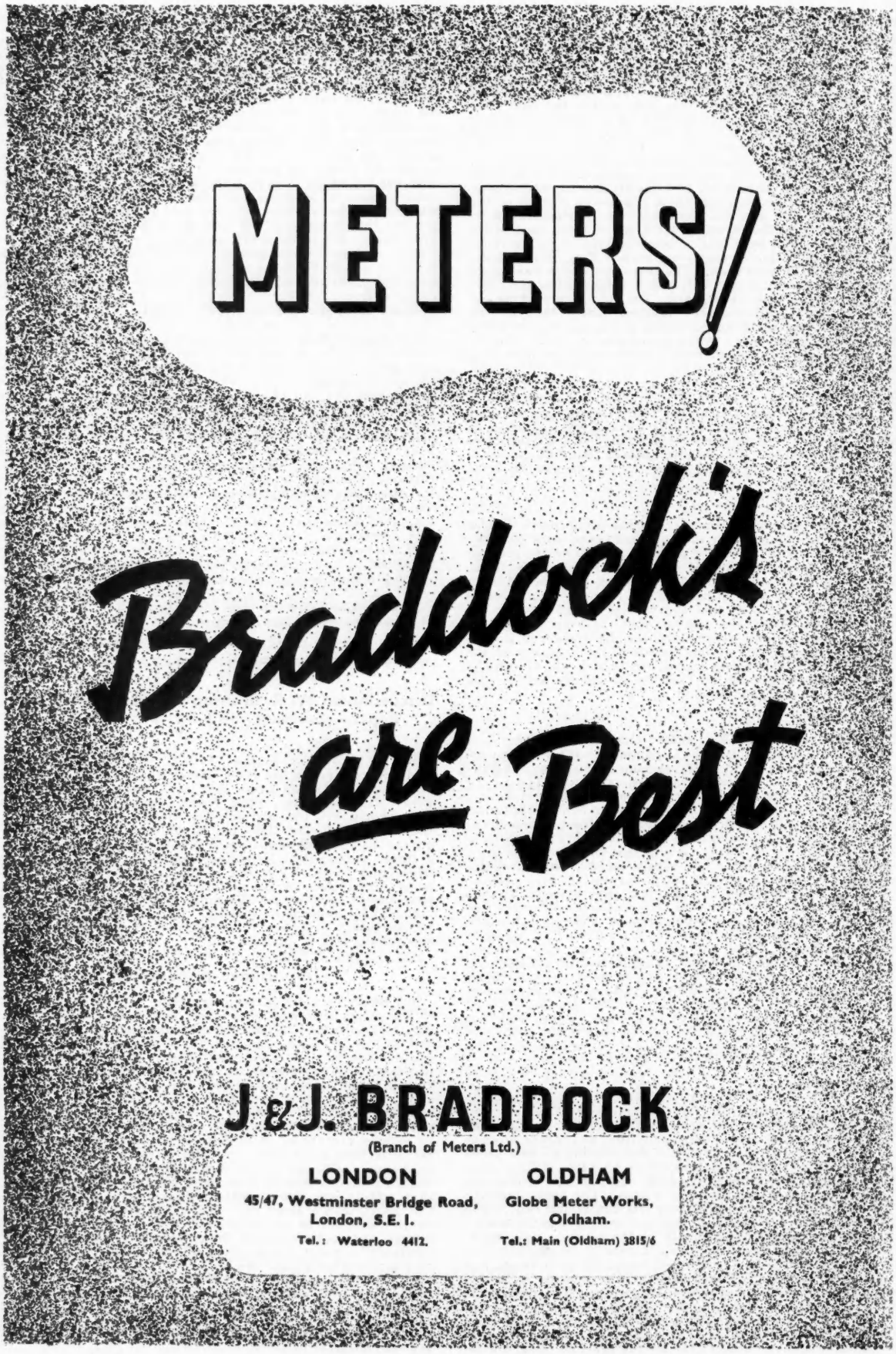
The annual report of the Engineer, General Manager, and Clerk of the Stretford and District Gas Board, Mr. James Carr, states that for the year ended March 31, 1937, the total quantity of gas made was 6,188,878 therms actual or 6,136,730 therms calculated on basis of declared calorific value of 500 B.Th.U. per cu.ft., and the quantity of gas sold was 5,621,838 therms, an increase of 653,724 therms, or 13·16%, as compared with the previous year ended March, 1936. The increase in the number of consumers is 1,837, or 6·36% during the year. The volume of gas sold during the year was 1,124,367,700 cu.ft., as compared with 993,622,900 cu.ft. during the year ended March, 1936. The total number of consumers at March 31, 1937, was 30,764, of which 13,353 have ordinary meters and 17,411 have prepayment meters, the increase in the number of consumers during the year being 1,837, of these 377 are ordinary meter consumers and 1,460 prepayment meter consumers. The coal carbonized during the year was 90,485 tons; the gas made per ton of coal carbonized was 71·62 therms (including benzole therms). The net receipts from residuals amounted to £55,759. Receipts for benzole, including naphtha, were £7,834. Total receipts for residuals and benzole are equivalent to 2·71d. per therm of gas sold compared with 2·41d. per therm last year. The coke and breeze available for sale was 50,480 tons, equivalent to 11·16 cwt. per ton of coal carbonized, compared with 11·02 cwt. per ton in the previous year. The reduced quantity of coke and breeze sold per ton of coal is in consequence of maintaining extra retort settings under fire, on account of inadequate gasholder storage with the greatly increased output of gas. The net price received for coke was 19s. 11½d. per ton. The mains have been considerably extended during the year to supply housing schemes in Stretford, Sale, Ashton-on-Mersey, and Flixton. The total length of main pipes laid during the year for extensions and improvement of the supply was 14,885 yd., and the number of service pipes to premises, 1,840. The total length of mains laid at March 31, 1937, was 193 miles 1,639 yd. The average price realized for gas per therm sold was 6·00d. net; this compares with 6·49d. net per therm sold last year. The total income on revenue account is £250,006, and the total expenditure on revenue account amounts to £210,758. The net result shows a gross balance on revenue account of £39,247, compared with £49,433 in 1936, a decrease of £10,185. A balance of £8,438 has been carried forward.

Discussion on W. R. Branson's Wales Association Paper—(*Continued from p. 741.*)

Mr. E. M. Edwards (Port Talbot), who seconded the vote, said that coal prices had been increased by 35% in the last three years, and he did not know that the figure had yet reached its peak. This, of course, made it more than ever important that they should get the best possible results from the coal that they carbonized, and that they should do all in their power to ensure that they obtained the coal they paid for. Coal was not a stable commodity. It varied from seam to seam, and even from truck to truck. It was in the sampling that more errors were caused than in the testing itself. It was possible with short-period tests to get abnormal results, which could not be obtained in continuous working. He also pointed out that it was necessary to have stable conditions at the start and at the close of the test.

Importance of Sampling.

Mr. Branson, after acknowledging the vote of thanks, replied to the points that had been raised in the discussion. He said that Mr. Edwards had touched upon one point which he himself had intended to raise—that was, the importance of careful sampling. While he agreed with the value of proximate analysis, it was useless unless great care was exercised in sampling. In answer to the question raised by the President, the test plant at Cardiff did give a fair idea of the behaviour of coal in the ordinary horizontal settings. He quite agreed that blending improved the quality of the coke, but it was impossible for him to include everything in a short Paper. He also agreed with Mr. Fox that a full scale test was of more value than a test on a small scale, but for the former he thought it was better to have a complete setting than (say) a single retort. One retort in a setting was not normally representative of the whole of the retorts in the same bed. Temperatures on one side would vary from those on the other, and with horizontals there were always some retorts hotter than the others. Therefore it was desirable to make a separation of one complete bed, with its own purification plant. As far as the 1 lb. test plant at Newport was concerned, he thought the 1/1,000th of a ton plant would be a little better. Even with the latter, the accuracy of the tar and liquor yield was not very great. If every undertaking was able to say: "If one coal is taken as a standard, other coals are worth so and so in relation to that standard," the Gas Industry might in the long run get some satisfaction, if not complete satisfaction.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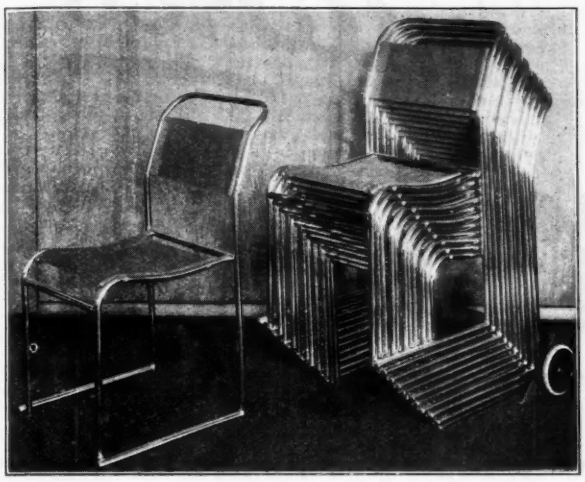
Trade Notes

"Pel" Tubular Steel Chairs for the Showroom.

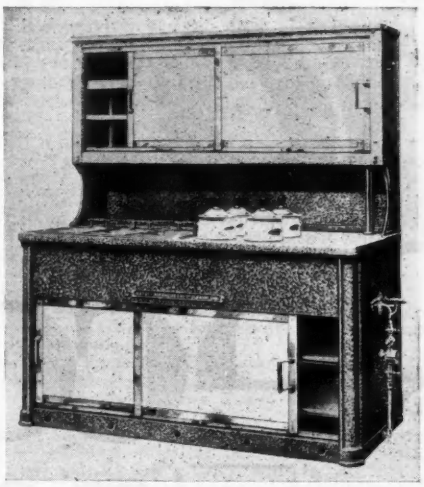
The many new showrooms erected recently in all parts of the country clearly demonstrate the extent to which gas undertakings are alive to the paramount necessity of having a modern setting for the display of up-to-date appliances. Quite a number of these premises include among their modern furnishings "Pel" tubular steel chairs, whose clear lines and bright colours are very much in keeping with the gas appliances of to-day. The comfort of these chairs, however, has not been sacrificed in the achievement of a modern appearance.



The great advantage of these chairs lies in the fact that they can be "nested." The large amount of space that can be saved by this feature is clearly seen in our photograph, which also shows the pleasing appearance of the "Pel" chair. Further particulars can be obtained from the manufacturers, Pel, Ltd., Oldbury, Birmingham.

A New Gas-Heated Hotcupboard.

The accompanying illustration is of an interesting design of hotcupboard recently constructed by Messrs. James Stott & Co. (Engineers), Ltd., of Vernon Works, Oldham, to meet the individual requirements of a customer.



The equipment consists of gas heated hotcupboard with sliding doors on one side. On the top are receptacles for vegetables, meats, sauces, soups, gravies, &c. Above the hotcupboard is a warming cupboard with doors on both sides, so that food may be placed in this on the kitchen side, and taken out from the service side.

The hotcupboard is fitted with thermostatic control, and the food at the top is kept hot by means of a water well which transmits its heat through tubes into the upper warming cupboard.

The apparatus is finished in vitreous mottled enamel, with white enamelled door panels, and chromium plated door styles and fittings, the whole being of very pleasing appearance.

Traffic Vibration

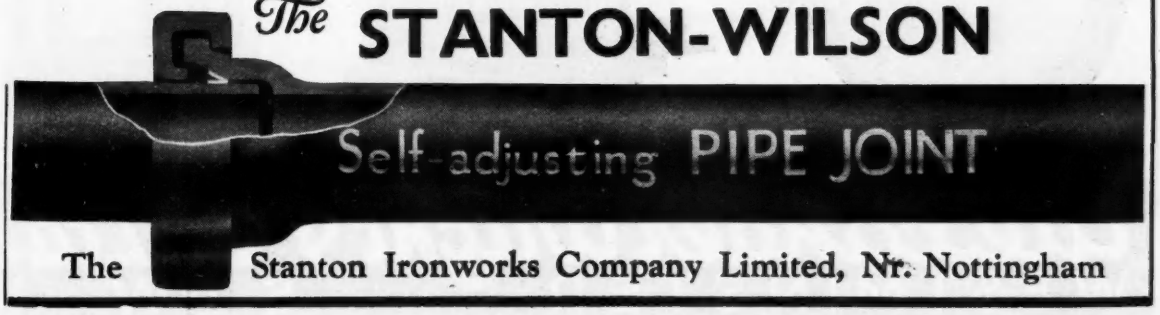
Rigid or Self-adjusting Joints?

Not many of the problems brought into being by the remarkable growth of road transport during the last decade are capable of easy solution.

There is at least one exception, however. For instance, though much has been heard of the danger caused to historic buildings by traffic vibration, the harmful effects of such vibration on water and gas mains are not so apparent. To water and gas engineers responsible, however, for the maintenance of these essential public services, this was a very real problem until a few years ago, for rigidly-jointed mains could not be expected to withstand the severe vibration caused by modern conditions.

Some six years ago the Stanton Company introduced the Stanton-Wilson Self-adjusting pipe-joint to overcome this and similar difficulties. That it has successfully done so is proved by the fact that more than 1,500 miles of Stanton-Wilson mains have now been laid by over 750 public authorities.

The STANTON-WILSON



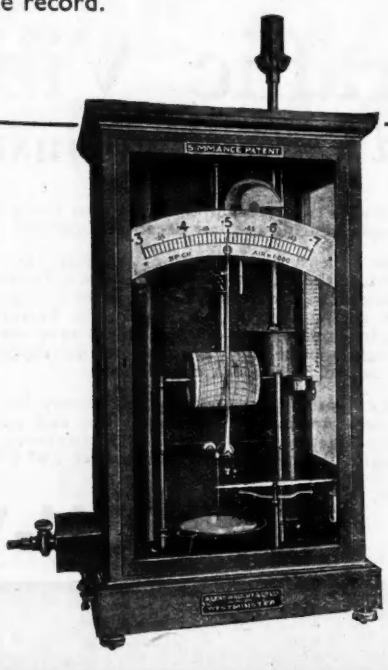
The Stanton Ironworks Company Limited, Nr. Nottingham

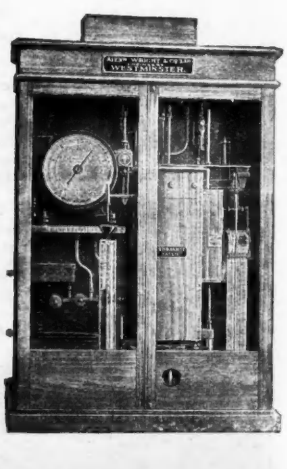
10/10 They always make full marks

Recorders

for every requirement

Wright's recorders are well known for the clarity of the records obtained and the accuracy of their records. The pen operating force usually is very small ; therefore pen-friction must be reduced to a minimum. In Wright's recorders this result is achieved by means of a balanced pen-arm supported on point-bearings, in conjunction with the well-designed Boat-pen and selected paper on which the charts are printed. The result is that the pen glides over the chart with just enough contact-pressure to make the record.





Alexander Wright & Co. Ltd.
WESTMINSTER · S · W · 1

Gas Markets and Manufactures

Stock Market Report

(For Stock and Share Lists, see later pages)

The first Account of the autumn opens this week and the prospects of the anticipated revival in business after the holidays now appear distinctly unfavourable. Affairs in this country are satisfactory, but world conditions will doubtless for some time to come dominate the situation. Investors are curtailing their commitments and concentrating on "safety-first" securities, with the result that British Funds continue to maintain a steady appearance and again closed at higher prices. There was little change in home rails, but a recovery took place in foreign bonds. Industrials were weak and prices generally downwards, the only feature being a renewal of interest in shipping shares. Movements in the oil and mining sections were small and somewhat irregular.

The volume of business in the Gas Market showed an increase over the previous week, though prices of some of the leaders were marked down. Gas Light units dropped 3d. to 24s. 6d.; Commercial lost a further 2 points to 90½; Wandsworth went a point lower; and Imperial Continental closed 5 points down at 140½. On the other hand, Lea Bridge was marked up another 3 points and Severn Valley ordinary shares gained 6d. to 22s. 6d. At the Provincial Exchanges, the only movement of note was a drop of 5 in Derby Consolidated to 150. In the Supplementary List nominal quotations closed unchanged.

The accounts of the Alliance and Dublin Consumers' Gas Company for the half-year ended June last show a gross profit of £78,150 (against £81,327). After adding interest and income-tax credits, the amount brought in from the last account (£50,291), and providing for debenture interest, there remains a balance available of £122,527. The Directors recommend the declaration of a dividend on the consolidated ordinary stock at the rate of 8% per annum, which will absorb £70,698, leaving a balance forward of £51,829. The Company's business has been making good steady progress and its dividend record for the last ten years is as follows: 1927, 7; 1928 to 1931, 7⅝; 1932, 7 15/16; 1933 and 1934, 7; 1935, 7 15/16; 1936, 8. At the latter rate the yield on the existing middle market price of 170½ *ex* div. works out at £4 13s. 10d.%.

Notice has been given of an application to the Board of Trade for a Special Order under the Gas Undertakings Acts to provide for the acquisition of the Southgate and District Gas Company by the Tottenham and District Company. The order also makes provision, *inter alia*, for the substitution of a basic price for the present standard price of gas.

Current Sales of Gas Products

The London Market for Tar Products.

Sept. 20.

Prices of tar products in the London market remain as indicated last week—namely:

Pitch, 38s. per ton f.o.b.
Creosote, 6d. to 6¼d.
Refined tar, 3⅜d.
Pure toluole, 2s. 5d. to 2s. 6d.; pure benzole, 1s. 9d.; 95/160 solvent naphtha, 1s. 8d.; and 90/160 pyridine, about 10s.—all per gallon naked at makers' works.

Tar Products in the Provinces.

Sept. 20.

The average prices of gas-works products during the week were: Gas-works tar, 23s. 6d. to 28s. 6d. Pitch—East Coast, 36s. to 37s. 6d. f.o.b. West Coast—Manchester, Liverpool, Clyde, 36s. to 37s. 6d.* Toluole, naked, North, 1s. 8½d. to 1s. 9½d. Coal tar, crude naphtha, in bulk, North, 8¼d. to 8¾d. Solvent naphtha, naked, North, 1s. 5½d. to 1s. 6d. Heavy naphtha, North, 1s. 3d. to 1s. 3½d. Creosote, *ex* works, in bulk, North, liquid and salty, 5d. to 5½d.; low gravity, 4⅜d. to 4½d. Heavy oils, in bulk, North, 5d. to 5½d. Carbolic acid 60's, 4s. 1½d. to 4s. 3d. Naphthalene, £18 to £20. Salts, 90s. to 95s., bags included. Anthracene "A" quality, 4½d. to 4⅝d. per minimum 40% purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Sept.* 18.

There is little of consequence to report in the market during the week. New business is not too plentiful, but prices continue quite steady.

Crude gas-works tar.—Actual value is 37s. to 38s. per ton *ex* works in bulk.

Pitch remains dull with quotations unchanged at round 30s. to 32s. 6d. per ton f.o.b. Glasgow for export, and 30s. per ton *ex* works in bulk for home trade.

Refined tar is reasonably active considering the time of the year, with prices steady at 3d. to 3¼d. per gallon free on rails for export, and 3½d. to 3¾d. per gallon *ex* works in buyers' packages for home trade.

Creosote oil.—There is a good call for prompt supplies and quotations are not lower than the following: Specification oil, 5½d. to 5⅝d. per gallon; low gravity, 6¼d. to 6½d. per gallon; neutral oil, 5¼d. to 5½d. per gallon; all *ex* works in bulk.

Cresylic acid.—New business is slow to mature, but makers are maintaining their prices as follows: Pale, 97/99%, 4s. 1d. to 4s. 4d. per gallon; dark, 97/99%, 3s. 10d. to 4s. per gallon; and pale, 99/100%, 4s. 6d. to 4s. 9d. per gallon; all *ex* works in buyers' packages.

Crude naphtha is valued at round 6d. to 6½d. per gallon *ex* works in bulk, according to quality and district.

Solvent naphtha.—90/160 grade is 1s. 5d. to 1s. 6d. per gallon, and 90/190 heavy naphtha, 1s. to 1s. 1d. per gallon.

Motor benzole remains at about 1s. 4½d. to 1s. 5d. per gallon.

Pyridine.—Prices are nominal at 8s. to 9s. per gallon for 90/160 grade, and 9s. to 10s. per gallon for 90/140 grade.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s. d.		s. d.	
Crude benzole	0 9½	to	0 10	per gallon at works
Motor "	1 3	"	1 3½	" " "
90% "	1 4	"	1 4½	" " "
Pure "	1 8	"	1 8½	" " "

Contracts Advertised To-Day

Coal.
Haworth Gas Department. [p. 774.]

Coal Handling Plant.
Macclesfield Gas Department. [p. 774.]

Hire of Coal Wagons.
Stockport Gas Department. [p. 774.]

Overseas Opportunities

Johannesburg.

H.M. Trade Commissioner at Johannesburg reports that the South African Railways and Harbours Administration is calling for tenders (Contract No. 1456) for the supply and delivery of quantities of galvanized iron piping, screwed and socketed, ½ in., 2 in., and 3 in. diameter; 2 in. wrought iron piping, steam quality; and pipe fittings. Tenders, endorsed "Tender No. 1456, for Pipes and Fittings," should be addressed to the Chief Stores Superintendent, Park Station Chambers, Rissik Street, Johannesburg, by whom they will be received up to 3 p.m. on Oct. 11, 1937. (Ref. T. 19399/37.)

400 plants in 24 countries

This installation, built for the Municipality of Svendborg, Denmark, is an interesting example of the modern Glover-West vertical retort plant designed for the smaller works. It is an eight-retort unit with fuel-gas producers equipped for breeze-burning, waste-heat recovery plant and electric lift. Coaling is by means of an automatic skip-hoist.

WEST'S GAS IMPROVEMENT CO., LTD.

MANCHESTER: ALBION IRONWORKS, MILES PLATTING ■ **LONDON:** COLUMBIA HOUSE, ALDWYCH, W.C. 2

STOCK AND SHARE LIST

Official Quotations on the London Stock Exchange

Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Sept. 17	Rise or Fall on Week.	Transactions, Lowest and Highest Prices During the Week.
1,767,439	Stk.	Sept. 6	8	8	Alliance & Dublin Ord. ...	168—173*	...	...
374,000	,,	June 21	4	4	Do. 4 p.c. Deb. ...	95—100	...	...
558,890	,,	Aug. 9	7	7	Barnet Ord. 7 p.c.	158—163	...	...
300,000	1	Apl. 5	1/4½	1/9⅔	Bombay, Ltd.	26/6—28/6	...	...
179,915	Stk.	Aug. 9	9½	9½	Bournemouth sliding scale ...	200—205	...	...
590,407	,,	,,	7	—	Do. 7 p.c. max. ...	158—163	...	160—162
493,960	,,	,,	6	6	Do. 6 p.c. Pref. ...	130—135	...	...
50,000	,,	June 21	3	3	Do. 3 p.c. Deb. ...	79—84	...	...
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	98—103	...	99
335,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	116—121	...	...
357,900	,,	Aug. 9	7½	7½	Brighton, &c., 6 p.c. Con. ...	152—157	...	...
649,955	,,	,,	6½	6½	Do. 5 p.c. Con. ...	135—140	...	137½—139½
205,500	,,	,,	6	6	Do. 6 p.c. 'B' Pref.	127—133	...	...
855,000	,,	Mar. 1	7	8	British Ord.	148—153	...	150—151
100,000	,,	June 21	7	7	Do. 7 p.c. Pref.	140—145	...	...
350,000	,,	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	108—113	...	...
120,000	,,	June 7	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	102—107	...	...
450,000	,,	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	...
100,000	10	22 May '33	6	4	Cape Town, Ltd.	1⅛—2⅛	...	42/6
100,000	10	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1⅛—3⅛	...	...
150,000	Stk.	June 21	4½	4½	Do. 4½ p.c. Deb. ...	79—84	...	82½
626,860	,,	July 19	6	6	Cardiff Con. Ord.	125—130	...	...
237,860	,,	June 7	5	5	Do. 5 p.c. Red. Deb.	107—112	...	...
98,936	1	Apl. 5	2/-	2/-	Colombo Ord.	1⅝—1⅞	...	...
24,510	1	,,	1/4⅛	1/4⅛	Do. 7 p.c. Pref. ...	23/—25/-	...	...
739,453	1	Mar. 15	-/11·48	-/11·48	Colonial Gas Assn. Ltd. Ord..	18/—20/-	...	18/7½
296,144	1	,,	1/3·30	1/3·30	Do. 8 p.c. Pref	22/6—24/6	...	24/1½
1,775,005	Stk.	Aug. 9	5	5	Commercial Ord.	88—93	−2	89—89½
620,000	,,	June 7	3	3	Do. 3 p.c. Deb. ...	74—79	...	75½
286,344	,,	Aug. 23	5	5	Do. 5 p.c. Deb. ...	113—118	...	...
807,560	,,	Aug. 9	7	7	Croydon sliding scale ...	140—145	...	143½—144½
644,590	,,	,,	5	5	Do. max. div.	108—113	...	...
620,385	,,	June 21	5	5	Do. 5 p.c. Deb.... ...	113—118	...	...
239,000	,,	Aug. 9	5	5	East Hull Ord. 5 p.c....	98—103	...	...
185,355	,,	Aug. 9	6	6	East Surrey Ord. 5.p.c. ...	120—125	...	...
176,211	,,	June 7	5	5	Do. 5 p.c. Deb. ...	113—118	...	...
250,000	1	July 5	4	7	Gas Consolidation Ord. ...	20/—22/-	...	...
250,000	1	May 24	4	4	Do. 4 p.c. Red Cum. Pref.	19/—21/-	...	...
19,255,284	Stk.	Aug. 9	5⅔	5⅔	Gas Light & Coke 4 p.c. Ord.	24/—25/-a	−·/3	24/1⅛—24/10⅛
2,600,000	,,	,,	3⅛	3⅛	Do. 3⅛ p.c. max.	82—85	...	83¾—84¾
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	99—102	...	99½—101
2,993,000	,,	July 5	...	3½	Do 3½ p.c. Red. Pref.	100—103	...	101½—102½
8,602,497	,,	May 24	3	3	Do. 3 p.c. Con. Deb. ...	76—79	...	76½—78½
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	111—114	...	113—114
3,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb....	110—113	...	...
700,000	,,	Sept. 6	3½	3½	Do. 3½ p.c. Red. Deb....	94—99*	...	97½
270,466	,,	Aug. 23	6	6	Harrogate New Cons. ...	120—125	...	...
213,200	,,	Aug. 9	6	6	Hornsey Con. 3½ p.c. ...	118—123	...	...
5,600,000	,,	May 24	8	12	Imperial Continental Cap. ...	138—143	−5	140—146
223,130	,,	July 19	3½	3½	Do. 3½ p.c. Red. Deb. ...	89—94	...	...
285,242	,,	Aug. 9	8½	8½	Lea Bridge 5 p.c. Ord. ...	167—172	+3	...
75,000	,,	May 24	†10	†10	Malta & Mediterranean .. Metropolitan (of Melbourne)	150—160	...	153—154¾
392,000	—	Apl. 1	5½	5½	5½ p.c. Red. Deb.	98—103	...	...
231,978	Stk.	Aug. 23	5	5	M.S. Utility 'C' Cons. ...	101—106	...	...
968,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	96—101	...	...
360,075	,,	June 21	4	4	Do. 4 p.c. Deb. ...	97—102	...	...
148,955	,,	,,	5		Do. 5 p.c. Deb. ...	115—120	...	...
125,000	—	July 1	3½	3½	Do. 3½ p.c. Rd.Rg.Bds.	96—99	...	...
675,000	Stk.	May 3	†6	†9	Montevideo, Ltd.	89—94	...	90½—92
250,000	,,	Aug. 9	7½	7½	North Middlesex 6 p.c. Con.	150—160	...	153
396,160	,,	Aug. 9	5	5	Northampton 5 p.c. max. ...	110—115	...	...
300,000	,,	Apl. 19	†9	†7	Oriental, Ltd....	162—167	...	...
468,537	,,	June 7	8	8	Plymouth & Stonehouse 5 p.c.	160—170	...	160
621,667	,,	Aug. 9	8¼	8¼	Portsmouth & Gosport Cons.	164—169	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	104—109	...	...
73,350	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	...
441,275	1	May 3	1/-	1/1½	Severn Val. Gas Cor. Ld. Ord.	21/6—23/6	+-/6	22/6—23/1½
460,810	1	Mar. 15	-/10⅛	-/10⅛	,, ,, 4½ p.c. Cum. Pref.	20/—22/-	...	...
133,201	Stk.	Aug. 23	5	8½	Shrewsbury 5 p.c. Ord. ...	130—135	...	...
1,371,752	1	Sept. 6	1/2⅞	1/2⅞	South East'n Gas. Cn.Ld. Ord.	23/6—25/6*	...	24/—24/6
871,636	1	,,	-/10⅛	-/10⅛	Do. 4½ p.c. Red. Cum. Pref.	20/—22/-*	...	20/6—21/6
498,818	1	,,	4	4	Do. 4 p.c. Cum. Pref. ...	18/—20/-*	...	19/—20/6
450,000	Stk.	Aug. 9	4	4	Do. 4 p.c. Deb.	99—102	...	...
150,000	,,	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—99	...	...
6,709,895	,,	Aug. 9	6	5	South Met. Ord.	103—106	...	103½—104½
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf. ...	130—135	...	132
850,000	,,	,,	4	4	Do. 4 p.c. Irred. Pf. ...	98—101	...	98½—99½
1,895,445	,,	June 21	3	3	Do. 3 p.c. Deb. ...	75—80	...	76½
1,000,000	,,	July 5	5	5	Do. 5 p.c. Red. Deb....	110—113	...	111—112
1,543,795	,,	Aug. 9	6	6	South Suburban Ord. 5 p.c....	120—125	...	122½
512,825	,,	,,	5	5	Do. 5 p.c. Pref....	110—115	...	113
500,000	,,	,,	4	4	Do. 4 p.c. Pref....	95—100	...	...
250,000	,,	,,	...	§18/9	Do. 3¾*p.c. Red. Pref.	98—101	...	...
888,587	,,	June 7	5	5	Do. 5 p.c. Deb....	115—120	...	...
250,000	,,	,,	4	4	Do. 4 p.c. Deb....	97—102	...	...
200,000	,,	,,	...	...	Do. 3½ p.c. Red. Deb.	95—100	...	...
427,859	1	May 3	9⅔	1/2⅔	S. Western Gas & Water Ord.	19/—21/-	...	19/-
160,523	1	Apl. 19	-/10⅔	-/10⅔	Do. 4½ p.c. Red. Cum. Pf.	20/—22/-	...	...
110,000	Stk.	June 21	4	4	Do. 4 p.c. Red. Deb. ...	97—102	...	...
750,541	,,	Aug. 9	5½	5	Southampton Ord. 5 p.c. ...	111—116	...	...
148,836	,,	June 7	4	4	Do. 4 p.c. Deb.	97—102	...	...
350,000	,,	Aug. 23	5½	5½	Swansea 5½ p.c. Red. Pref. ...	110—115	...	114½
94,000	,,	June 7	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...	...
1,076,490	,,	Aug. 9	6⅔	6⅔	Tottenham and District Ord.	135—140	...	138
409,835	,,	,,	5⅔	5⅔	Do. 5½ p.c. Pref....	121—126	...	125
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...	...
371,850	,,	June 7	4	4	Do. 4 p.c. Deb. ...	97—102	...	...
750,000	1	Apl. 5	4	6	U. Kingdom Gas Cor. Ord.	20/—22/-	...	20/10½—21/3
936,338	1	May 3	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	20/—22/-	...	21/—21/3
740,933	1	June 7	4½	4½	Do. 4½ p.c.2nd Non-Cum.Pf.	17/—19/-	...	18/1½
700,000	Stk.	Mar. 15	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—99	...	...
373,939	,,	Aug. 9	7	7	Uxbridge, &c., 5 p.c. ...	147—152	...	...
133,010	,,	,,	5	5	Do. 5 p.c. Pref. ...	109—114	...	...
1,371,138	,,	Aug. 9	7	7	Wandsworth Consolidated ...	140—145	−1	140
1,620,615	,,	,,	5	5	Do. 5 p.c. Pref. ...	117—122	...	...
500,000	,,	,,	4	4	Do. 4 p.c. Pref. ...	97—100	...	98½
1,343,964	,,	June 7	5	5	Do. 5 p.c. Deb. ...	115—120	...	117
383,745	,,	,,	4	4	Do. 4 p.c. Deb. ...	97—102	...	...
558,342	,,	Aug. 9	7	7	Watford and St. Albans Ord.	140—145	...	142½—144
200,000	,,	,,	5	5	Do. 5 p.c. Pref. ...	109—114	...	...
200,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	121—126	...	...
200,000	,,	June 7	4	4	Do. 4 p.c. Red. Deb.	97—102	...	...
100,000	,,	,,	3½	3½	Do. 3½ p.c. Red.Deb.	95—100	...	...

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Issue. £	Stock or Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations. Sept. 17.	Rise or Fall on Week.	Transactions, Lowest and Highest During the Week.
BRISTOL EXCHANGE.								
347,756	Stk.	July 19	6	5	Bath Cons.	120—122	+1	...
1,667,250	,,	July 19	5	5	Bristol, 5 p.c. max.	117—118	...	...
120,420	,,	June 7	4	4	Do. 1st 4 p.c. Deb. ...	100½—102½	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	100½—102½	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	120—123	...	...
274,000	,,	July 19	5	5	Newport (Mon.) 5 p.c.max. ...	101—106	...	...
13,200	12	Sept. 6	8	7	Pontyp'l Gas & W. 10 p.c. 'A'	13—14*	...	...
13,600	10	,,	6	5	Do. 7 p.c. 'B'	11⅞—12⅛*	...	...
40,000	10	,,	6	5	Do. 7 p.c. 'C'	11⅞—12⅛*	...	...
140,778	Stk.	Aug. 9	5	5	Weston-super-Mare Cons. ...	110—112	...	...
64,338	,,	June 21	4	4	Do. 4 p.c. Deb.	96—98	...	...
33,340	,,	,,	7½	7½	Do. 7½ p.c. Deb.	157—160	...	...
LIVERPOOL EXCHANGE.								
157,150	Stk.	Aug. 9	6½	5	Chester 5 p.c. Ord.	104—109	...	...
92,500	,,	June 21	4	4	Do. 4 p.c. Pref.	97—101	...	...
36,430	,,	,,	3½	3½	Do. 3½ p.c. Deb. ...	89—92	...	...
41,890	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	98—102	...	...
2,167,410	,,	Aug. 23	6	6	Liverpool 5 p.c. Ord. ...	125—127	...	...
245,500	,,	June 21	5	5	Do. 5 p.c. Red. Pref. ...	99—104	...	...
306,083	,,	July 1	4	4	Do. 4 p.c. Deb. ...	102—104	...	...
106,280	,,	Aug. 9	10	10	Preston 'A' 10 p.c.	206—216	...	...
188,219	,,	,,	7	7	Do. 'B' 7 p.c.	147—157	...	...
NEWCASTLE EXCHANGE.								
122,577	Stk.	Aug. 9	8	8	Blyth 5 p.c. Ord.	165—166	...	...
732,000	,,	Aug. 9	5	5	Hartlepool G. & W. Cn. & New	122—123	...	...
2,061,315	,,	Aug. 9	5⅝	5	Newcastle & Gateshead Con.	23/9—24/3a	...	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	38—100	+1	...
776,706	,,	June 21	3½	3½	Do. 3½ p.c. Deb. ...	91—92	...	...
277,285	,,	Nov. 2	5	5	Do. 5 p.c. Deb. '43...	108—109	...	...
332,351	,,	Aug. 23	6	6	Sunderland 6 p.c. max. ...	139—141	...	...
NOTTINGHAM EXCHANGE.								
542,270	Stk.	Aug. 9	9	6	Derby Con.	145—155	−5	...
55,000	,,	June 7	4	4	Do. 4 p.c. Deb. ...	100—105	...	...
20,000	10	June 21	5	5	Long Eaton 5 p.c. Pref. ...	10—12	...	...
80,000	Stk.	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...	...
SHEFFIELD EXCHANGE.								
10,000	Stk.	Feb. 15	10	10	Great Grimsby 'A' Ord. ...	210—220	...	...
6,500	,,	,,	10	10	Do. 'B' Ord. ...	210—220	...	...
79,000	,,	,,	10	10	Do. 'C' Ord. ...	205—210	...	...
1,806,339	,,	Aug. 23	6	6½	Sheffield Cons.	145—149	...	...
95,000	,,	July 5	4	4	Do. 4 p.c. Deb.	100—103	...	...

Supplementary List of Stocks and Shares not Officially Quoted

202,152	Stk.	Sept. 6	25/-b	5	Ascot Ord.	100—105*	...	...
128,182	,,	July 5	5	5	Do. 5 p.c. Pref.	108—113	...	...
573,156	1	May 24	5	5	Assd. Gas and Water Ord. ...	19/6—21/6	...	19/6
167,506	1	...	...	...	Do. 4 p.c. Red. Cum. Pref.	...	...	...
500,000	1	May 24	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/6—21/6	...	...
500,000	Stk.	Sept 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100*	...	...
31,035	1	Aug. 23	...	-/4½	Associated Utilities 4 p.c. Pref.	17/—19/-	...	...
100,000	Stk.	...	...	...	Do. 3½ p.c. Red. Deb.	95—100	...	...
17,000	,,	Aug. 23	8	8	Bognor Orig. Ord. 'A' ...	160—170	...	...
62,210	,,	,,	8	8	Do. New Addl. 'A' ...	160—170	...	...
87,160	,,	,,	7	7	Do. New 7 p.c. max. ...	141—146	...	...
37,440	,,	Aug. 9	10	10	Cam. Univ. & Town 10 p.c.max.	193—203	...	...
125,970	,,	,,	7	7	Do. 7 p.c. max.	135—140	...	..
39,025	,,	,,	5	5	Do. 5 p.c. max.	98—103	...	...
65,000	,,	Aug. 9	8½	7½	Eastbourne 'A' 5 p.c. ...	158—163	...	...
198,000	,,	,,	7	6	Do. 'B' 3½ p.c.	128—133	...	...
112,312	,,	,,	5	5	Do. 5 p.c. Pref.	108—113	...	...
130,000	,,	June 21	5	5	Do. 5 p.c. Deb.	115—120	...	...
24,000	30	Aug. 23	8½	8½	Great Yarmouth 8½ p.c. max.	44—49	...	...
59,400	30	,,	7½	7½	Do. 7½ p.c. max.	44—49	...	...
51,160	Stk.	June 7	5½	5½	Do. 5½ p.c. Deb.	120—125	...	...
152,600	,,	Sept. 6	9	8	Guildford Cons.	170—175*	...	...
54,055	,,	,,	5	5	Do. 5 p.c. Pref.	110—115*	...	...
68,250	,,	June 7	5	5	Do. 5 p.c. Deb.	113—118	...	116
156,600	,,	Aug. 23	7½	7½	Hampton Court Cons. ...	158—163	...	...
73,620	,,	Sept. 6	8½	8½	Luton Cons. 'A'	163—168*	...	...
107,960	10	Mar. 15	4	5½	Mid Kent Ord.	9—10	...	...
230,940	Stk.	Aug. 9	10	10	Oxford & District Ord. ...	203—208	...	...
47,112	,,	,,	5	5	Do. 5 p.c. Pref.	108—113	...	...
50,000	,,	,,	6	6	Do. 6 p.c. Red. Pref. ...	110—115	...	...
126,193	,,	May 3	7½	7½	Peterborough Ord.	159—169	...	...
64,990	,,	Sept. 6	7½	6½	Redditch Ord.	125—135*	...	...
166,850	,,	Aug. 9	8	8	Romford Ord.	155—165	...	...
60,000	,,	,,	4	4	Do. 4 p.c. Pref.	97—100	...	...
44,000	,,	Mar. 15	5	5	Do. 5 p.c. Deb.	115—120	...	...
25,570	,,	Aug. 9	5½	5½	Rugby 5½ p.c. Pref.	125—130	...	...
25,000	,,	,,	6	6	Do. 6 p.c. Red. Pref. ...	106—111	...	...
42,750	,,	June 7	5½	5½	Do. 5½ p.c. Deb.	122—127	...	...
10,950	,,	Aug. 23	8	8	Ryde Ord.	158—163	...	...
136,191	,,	Aug. 9	7	5	Scarborough Ord.	115—125	...	...
27,825	,,	Aug. 23	8	8	Shanklin & Ventnor Cons. ...	158—168	...	...
270,086	,,	Sept. 6	7	7	Slough Ord.	135—140*	...	...
21,000	,,	June 21	5	5	Do. 5 p.c. Deb.... ...	112—117	...	...
28,872	1	May 24	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	19/—21/-	...	...
28,866	1	Sept. 6	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6*	...	...
137,730	Stk.	Aug. 9	7	7	Southgate & Dist. 7 p.c. max.	140—145	...	...
62,500	,,	,,	5	5	Do. 5 p.c. Pref.	110—115	...	...
117,228	,,	Aug. 23	5	5	Swindon Cons.	106—111	...	...
60,425	,,	June 7	5	5	Do. 5 p.c. Deb.	110—115	...	...
64,380	,,	June 7	5	5	Torquay and Paignton 5 p.c. Pf	110—115	...	...
130,000	,,	Aug. 9	8	5	Wakefield Ord.	120—125	...	...
81,650	,,	,,	5	5	Do. 5 p.c. max.	103—108	...	...
82,000	,,	Aug.	6	6	Weymouth Ord.	103—108	...	...
98,384	,,	Aug. 9	6	6	Wolverhampton 6 p.c. Pref...	125—130	...	...
160,000	,,	June 21	5½	5½	Do. 5½ p.c. Rd. Db	108—113	...	...
370,000	,,	Aug. 9	6	4	York Cons.	102—107	...	...
90,000	,,	June 21	5	5	Do. 5 p.c. Red. Deb. ...	105—110	...	...
133,640	,,	July 19	6½	6½	Yorktown (Cam.) 5 p.c Cons.	128—133	...	...
120,000	,,	,,	5	5	Do. 5 p.c. Pref.	108—113	...	...
35,000	,,	June 7	5½	5½	Do. 5½ p.c. Deb.	123—128	...	...

a The quotation is per £1 of Stock. b Actual for Quarter. * Ex div.

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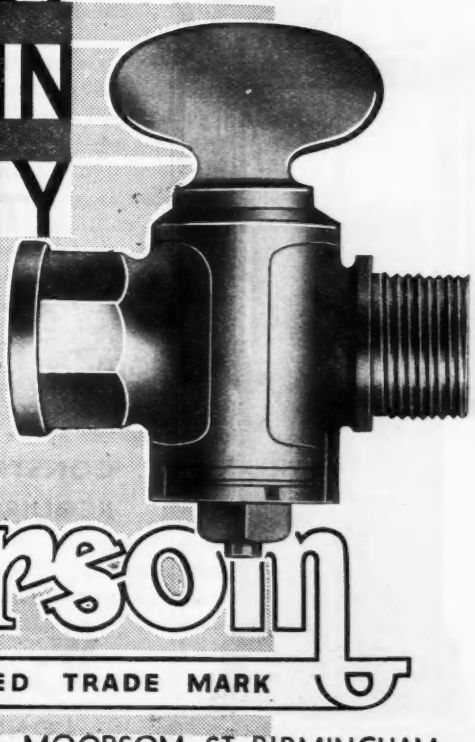

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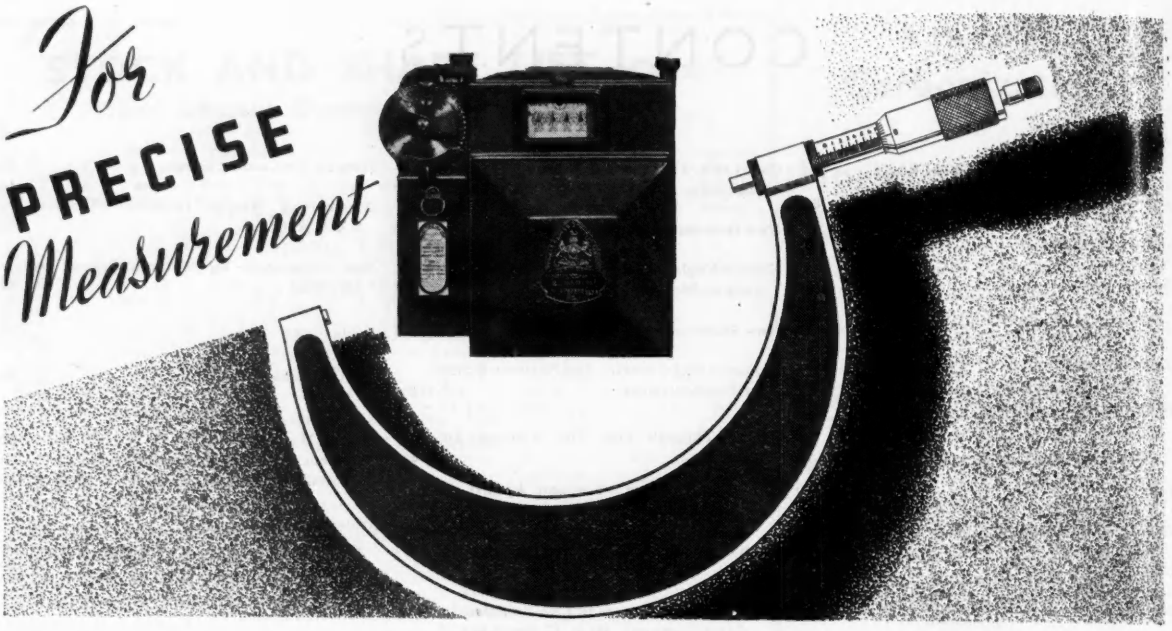

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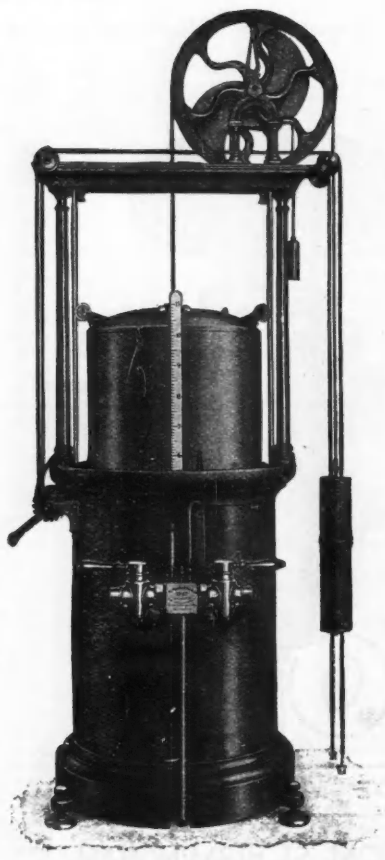

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